LOGY DEPT.

The OIL AND GAS JOURNAL

Using FRANKS Well Servicing Units

The Fastest on the Market

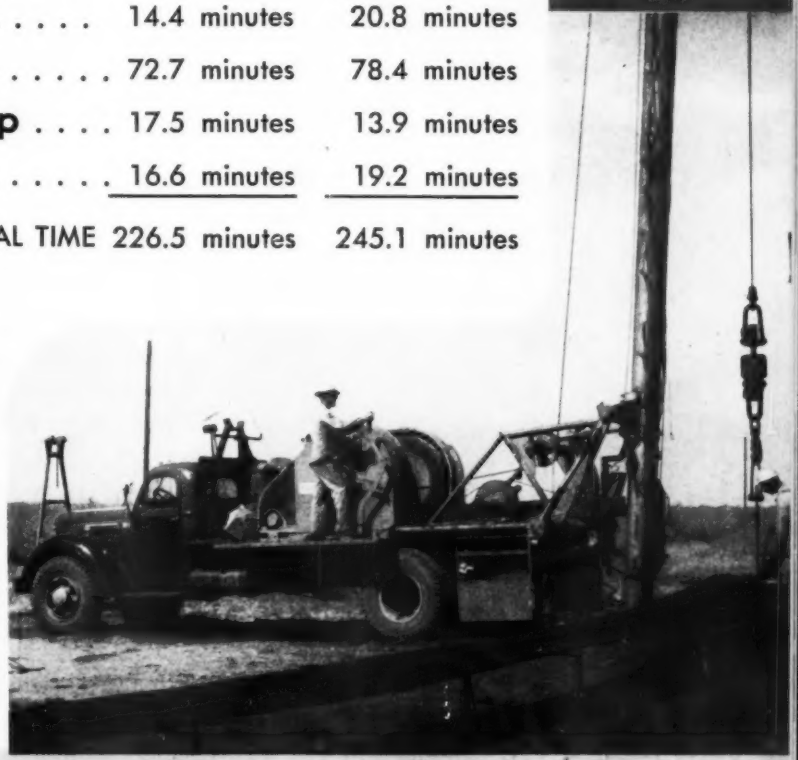
Means SAVINGS to both Contractor and Producer

Here is the story of the Franks Model 658 Servicing Unit and its performance in routine servicing over a year's period of wells averaging 6000 feet in depth.

	AVERAGE TIME PER WELL 4 Man Crew	3 Man Crew
Fastest Rigging up	14.1 minutes	20.7 minutes
Fastest Preparing to Pull	15.9 minutes	14.5 minutes
Fastest Pulling Rods	75.3 minutes	77.6 minutes
Fastest Servicing Pump	14.4 minutes	20.8 minutes
Fastest Running Rods	72.7 minutes	78.4 minutes
Fastest Preparing to Pump	17.5 minutes	13.9 minutes
Fastest Rigging Down	16.6 minutes	19.2 minutes
AVERAGE TOTAL TIME	226.5 minutes	245.1 minutes

Franks offers "On The Spot" field service with factory trained personnel, parts and shop facilities at Odessa, Kilgore, Houston, Alice, Seminole, Mt. Vernon, Great Bend, Casper, and Compton, Calif.

ss than 4¼ hours to do a COM-ETE rod job on a 6000-ft. well! at's what we mean by FASTEST!



FRANKS MFG. CORP. WELL SERVICING AND DRILLING UNITS TULSA, OKLAHOMA

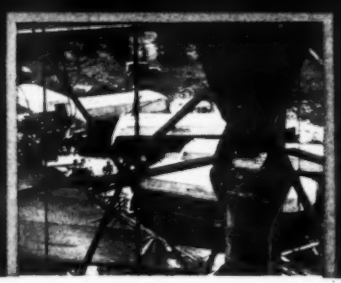
NKS MFG. CORP.
3218, TULSA, OKLA.
t: 149 Broadway, New York

AND REMEMBER, when "rigging down" is finished, you ROLL to the next job at regular truck highway speeds, WITHIN HIGHWAY WEIGHT LIMITATIONS, with all tools and crew on the one truck. This kind of performance means SAVINGS TO BOTH CONTRACTOR AND PRODUCER.

PRICE 50 CENTS TABLE OF CONTENTS PAGE 25 FEBRUARY 1, 1951

XUM

HOWCO EXPERIENCE ★ HOWCO SERVICE ★ HOWCO TOOLS RESEARCH EQUIPMENT



IT TAKES MORE THAN CEMENT AND WATER!

HOWCO
CEMENTING SERVICES

HOWCO RESEARCH NEVER STOPS! That's why so many difficult problems in oil well cementing get their first *right* answers from HOWCO . . . that's why so many advancements in cementing tool design and sound, successful cementing methods come from HOWCO . . . that's why HOWCO leads in oil well cementing . . . and that's why *you* should consult your nearby HOWCO representative about *your* cementing problems. Call him today!

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING!

HALLIBURTON OIL WELL CEMENTING CO. DUNCAN, OKLAHOMA.

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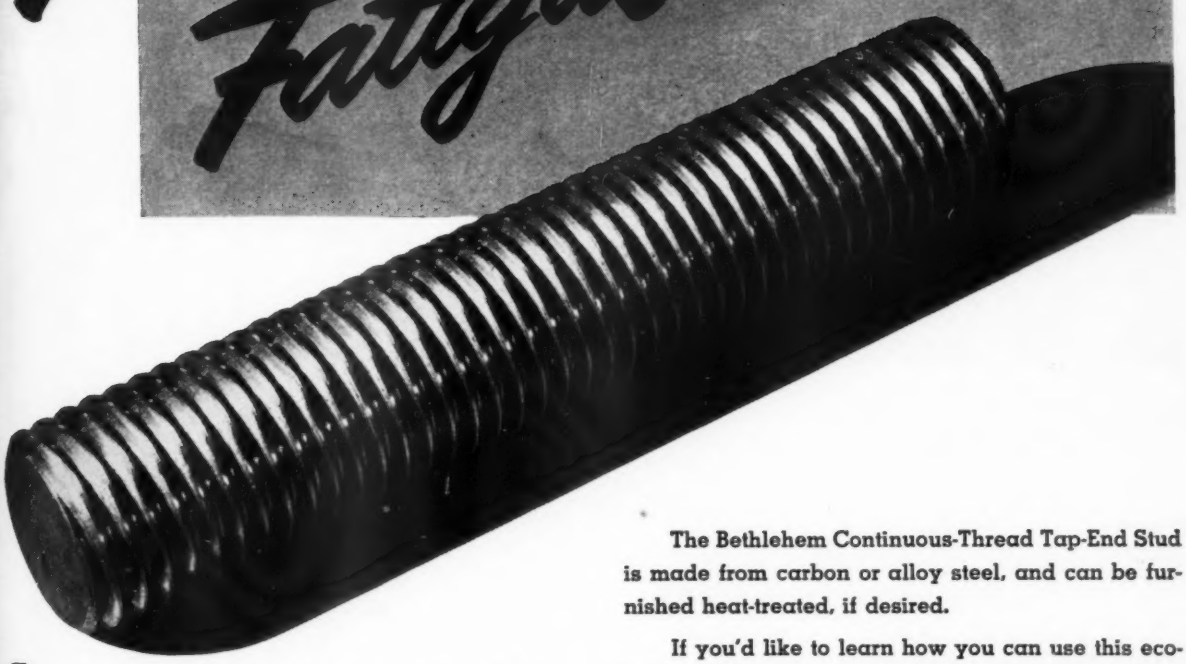
FIGHTS Fatigue Failure



Looking for a stud to combat premature fatigue failure? . . . One which really stays on the job, even under excessive strain and vibration? Use the Bethlehem Continuous-Thread Tap-End Stud.

The Bethlehem Continuous-Thread Tap-End Stud fights fatigue failure because it has no point of thread-runout. Thus the stress concentrations encountered in difficult bolting jobs are distributed over the effective working length of the stud.

Moreover, this husky stud carries two types of threads. Its chamfered tap-end is threaded to Class 5 fit, while the rounded nut-end is threaded to either Class 2, 3 or 7 fit. Yet so skillfully are these threads blended that the point of change is undetectable.

The Bethlehem Continuous-Thread Tap-End Stud is made from carbon or alloy steel, and can be furnished heat-treated, if desired.

If you'd like to learn how you can use this economical stud to best advantage, talk it over with a Bethlehem engineer. All you need do is contact our nearest sales office, or write to us at Bethlehem, Pa.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

Bethlehem supplies every type of Fastener

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910 at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951

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"Amazing," cried Crockett, "such development I've never seen!"

In the past 50 years the Southwest has emerged from an obscure position in the commercial world to one of the great industrial centers of the country.

Vast natural resources, assured low-cost power, and central location continue to attract new businesses each day.

Brown & Root offers you experienced counsel, backed by more than thirty years of successful engineering and construction in this great Southwest. Its complete knowledge of soil, terrain, people, and climatic conditions will result in faster, more economical completion of your contemplated project. A request from you will put Brown & Root consultants at your service.

BROWN & ROOT, Inc. *Engineers • Constructors*

P. O. BOX 3, HOUS[illegible] TEXAS

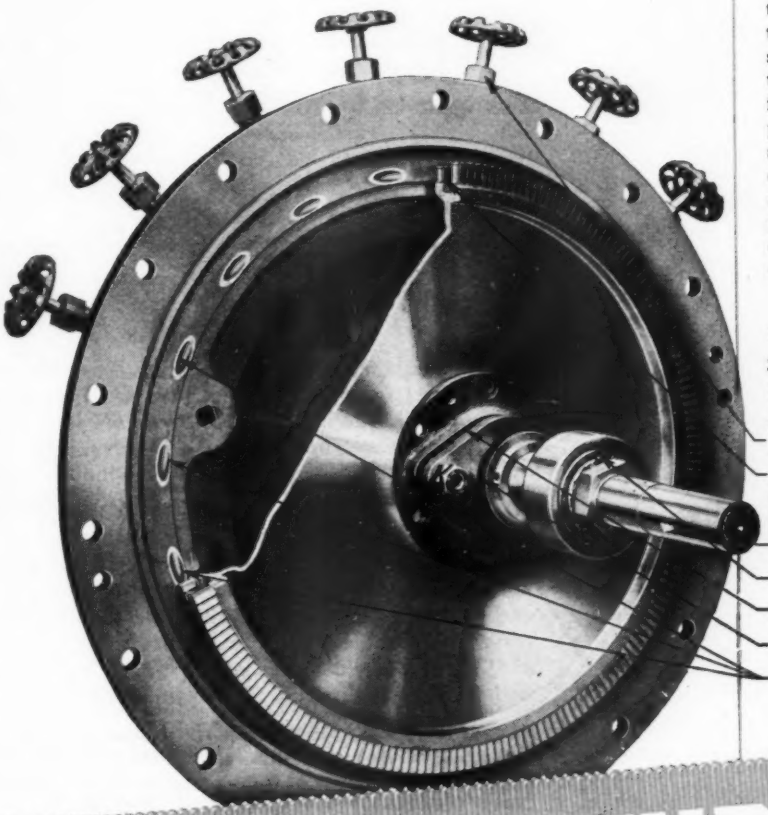
CABLE ADDRESS — BROWNBILT

Associate Companies — BROWN ENGINEERING CORP. • BROWN & ROOT MARINE OPERATORS, INC.

No other steam turbine offers you

SUCH VERSATILE STEAM NOZZLE CONTROL

The larger number of hand valves you see on a Coppus Steam Turbine promises you greater operating economy. At least 60% of the steam nozzles can be individually controlled to give maximum steam pressure in steam chest . . . a guarantee of best water rates at any load. Maintenance economy, too, is assured by the hard chromium plating of the shaft at the stuffing box. It provides the best possible smooth, non-corrosive surface for packing rings.


7 hand valves for efficient partial load operation, (20" turbine shown)
2 row velocity-stage turbine wheel with stainless steel turbine buckets — statically and dynamically balanced
30-40 carbon steel shaft
Oversized double row deep grooved ball bearing
Stuffing box with metallic packing ring
Heavy chrome plating of shaft through stuffing box
3 nozzles always open

Coppus Steam Turbines, Type TF, driving chemical transfer pumps at Celanese Corporation of America's Chemcel Plant

Coppus Steam Turbines ranging from 150 hp down to fractional in 6 frame sizes

MAKE TURBINE DOLLARS GO FARTHER

Why waste money buying turbines with higher horsepower ratings than you need? The higher the horsepower rating, the higher the price. Save money by selecting the Coppus Turbine size closest to your requirements from 150 hp down to fractional. And when you do, you save operating and maintenance costs, too. That's what these other Coppus features are designed to do: exclusive pilot operated excess speed safety trip supplementing constant speed governor; choice of metallic or carbon ring packing assemblies. Designs available for back pressures up to 75 pounds; replaceable cartridge type bearing housings. For full details . . .

WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORP.,
262 Park Avenue, Worcester 2, Mass.
Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

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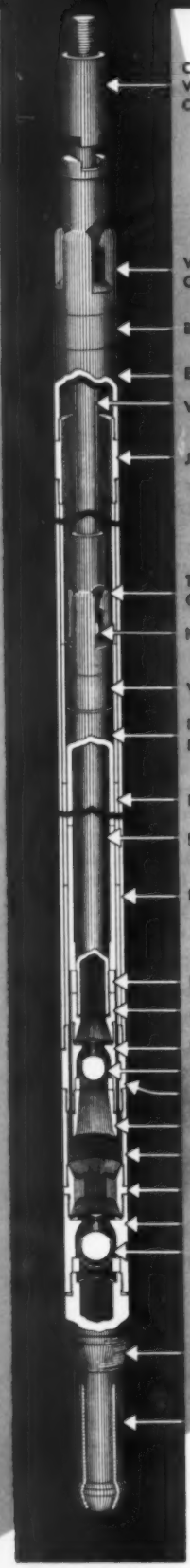
"OILWELL'S" NEILSEN SUBSURFACE PUMPS

The TOP-QUALITY Line



I-R Metal "Stationary" sectional liner barrel rod pump

I-R METAL . . . which is an exclusive Neilsen feature, has a combination of qualities that make it the finest metal for subsurface pumps on the market today. It is a ferrous alloy, consisting principally of iron and nickel in combination with carbon and boron.

LOW COEFFICIENT OF FRICTION . . . permits an I-R Metal to I-R Metal contact at much closer tolerances than specified by A.P.I. You get increased pumping efficiency that is maintained over much longer periods. Note the streamlined fittings.

HIGH ABRASION RESISTANCE — I-R Metal is inherently hard and resistant to abrasion. Where sand conditions are extremely severe, I-R Metal pumps are highly recommended and will quickly pay for themselves in longer service life.

HIGH CORROSION RESISTANCE —I-R Metal being a nickel-boron alloy has been found to be outstanding in corrosion resistance in well fluids containing salt, hydrogen sulphide and carbon dioxide.

PRECISION WORKMANSHIP—Molten I-R Metal is centrifugally cast in seamless steel tubing. Liner sections receive their rifle honing *after assembly* in the barrel and plungers are superfinished and *factory fitted* with microscopic accuracy. Result is a smooth running pump with exceptional operating efficiency under all conditions.

Neilsen I-R Metal Rod Pumps are built in six sizes to run in 1½" to 3" tubing including 1" to 2¼" bores and pump lengths from 7' to 36' and longer if necessary. The Tubing Pumps are built to run on 2", 2½" and 3" tubing with bores of 1¾", 2¼" and 2¾" and with barrel lengths from 5' to 36' and longer.

ASK . . . for your copy of the "Oilwell"-Neilsen Subsurface Pump Catalog and get the facts on "Oilwell's" PUMP-EXCHANGE AGREEMENT. Whenever you want help with a production problem . . . CALL "OILWELL."

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Branches Serving All Oil Fields

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USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL

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It's MURPHY DIESEL POWER for Drilling Contractor, CARL PERRY, Freeport, Texas

Mr. E. H. Harris is shown here with Carl Perry's new Murphy powered rig.

LIKE Carl Perry, an ever increasing number of drilling contractors are finding that the performance and dependability of Murphy Diesels can be mighty important factors in making hole. And the unmatched fuel economy and long life of Murphy Diesels are mighty important factors in the profit and loss statement.

The combination of performance, dependability, economy and long life results from another combination—Murphy Diesel's proven design features such as "true" diesel operation . . . unit fuel injection . . . four valves per cylinder . . . hydraulic servo-type governor . . . and many others.

The complete story of these features and how you can put their advantages to work for you is told in the booklet *"10 Questions to Ask a Diesel Engine Salesman."* Ask your Murphy Diesel Dealer for a copy or write direct.

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OIL INDUSTRY FACTORY BRANCH — *Sales, Parts and Service:*
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MURPHY DIESEL

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 1200 and 1400 RPM, 90 to 220 H.P. Generator Sets 60 to 133 K.W.

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NEW HAT FOR EXPERIENCED HEADS

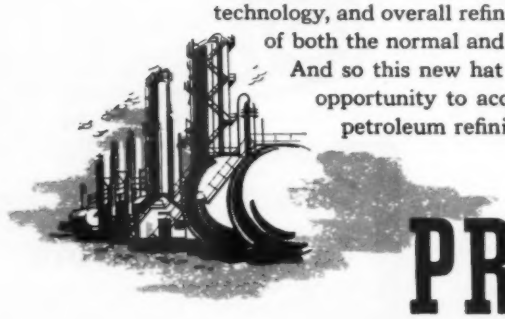
Only the name is new to the petroleum industry.

Key personnel of Procon Incorporated in both office and field capacities have worked closely together for many years in the design, engineering and field erection of refinery processing facilities.

Even though the name is new, those who shoulder the responsibilities of the company are long experienced in every phase of refinery construction.

When Procon handles a construction job you can be sure that you are getting maximum value for every dollar invested. A seasoned knowledge of petroleum technology, and overall refinery operation is added to the thorough understanding of both the normal and unusual problems of construction.

And so this new hat for experienced heads means that you now have an opportunity to acquire a construction service that reaches deeply into petroleum refining practices and techniques.



PROCON *Incorporated*

75 EAST JACKSON BLVD., CHICAGO 4, ILLINOIS

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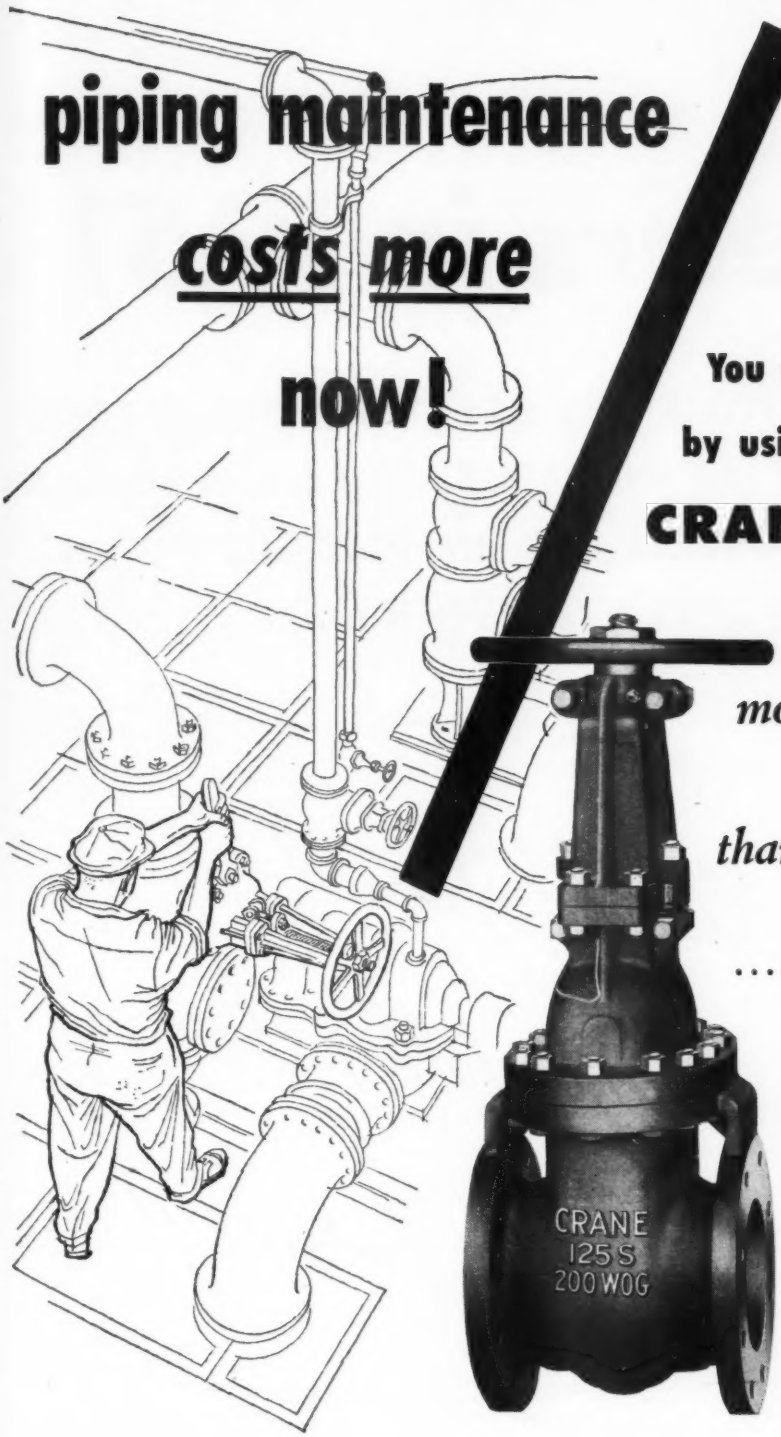
piping maintenance costs more now!



You do less of it

by using Dependable Quality

CRANE VALVES

That's why more Crane Valves are used than any other make

. . . no bonnet trouble with this valve

A typical example of low-maintenance Crane Quality—No. 465½ 125-Pound Iron Body Gates. Rarely does the bonnet joint need attention. Flange construction includes reinforcement to prevent distortion and utilizes more bolts, more closely spaced than is usual in valves of this class. Crane precision-guided seating reduces seat and disc wear. Packing has long life because these valves have a deep stuffing box filled with high grade asbestos ring packing. A ball-type gland equalizes the packing load.

Better performance features like these make Crane the better buy in valves of every type. Ask your Crane Representative for a demonstration.

CRANE

CRANE CO., *General Offices:*
836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

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The OIL AND GAS JOURNAL

50 Years in 1951*

WITH THIS GREAT SERVICE RECORD TO THE INDUSTRY...THE OIL AND GAS JOURNAL AGAIN PLEDGES TO ALL READERS EVERYWHERE...

"follow the Journal— and you follow the Oil Industry!"

*In May 1951 this oldest, largest and most fully staffed publication serving all divisions of the oil industry enters its 50th year of service.

This advertisement and others to follow are designed to introduce to readers the many editorial features and services found in the Journal.

"follow the Journal— and you follow the Oil Industry!"

Why can only the Journal make this pledge....?

BECAUSE... ONLY the Journal, among all other oil publications, provides fresh, world-wide news and operating statistics. Being essentially a technical publication, with 87% of circulation to engineers and operating men, the Journal's news pages feature the unique technical-news approach for which it is famous. Monthly publications cannot even attempt to provide this very important service.

BECAUSE... ONLY the Journal offers a complete single source for technical and operating developments in all operating segments of the industry . . . presented first and in fast tempo. About 40% of editorial space devoted to engineering articles is used for technical illustrations, charts, diagrams, maps, photographs, etc., all for the purpose of translating tedious narrative writing into the most modern type of technical art . . . attractively, effectively, and designed for easy reading.

BECAUSE... ONLY the Journal can assure its readers that their advertising pages are the most complete available. Carrying more advertising than the next three oil papers during 1950, the Journal readers have before them the greatest parade of new product information, suggestions for efficient and most economical use of equipment, etc. Through these advertising pages, the operating man is always informed on this very important phase of his job.

Note this trend

There are over 30 oil papers published, BUT BUSY OIL MEN haven't time to read 30 oil papers, or 20 oil papers, or 10, or 5 oil papers . . .

So more and more oil men are concentrating their valuable reading time in the leading oil paper, confident in the fact that when you . . .

"follow the Journal— you follow the Oil Industry!"

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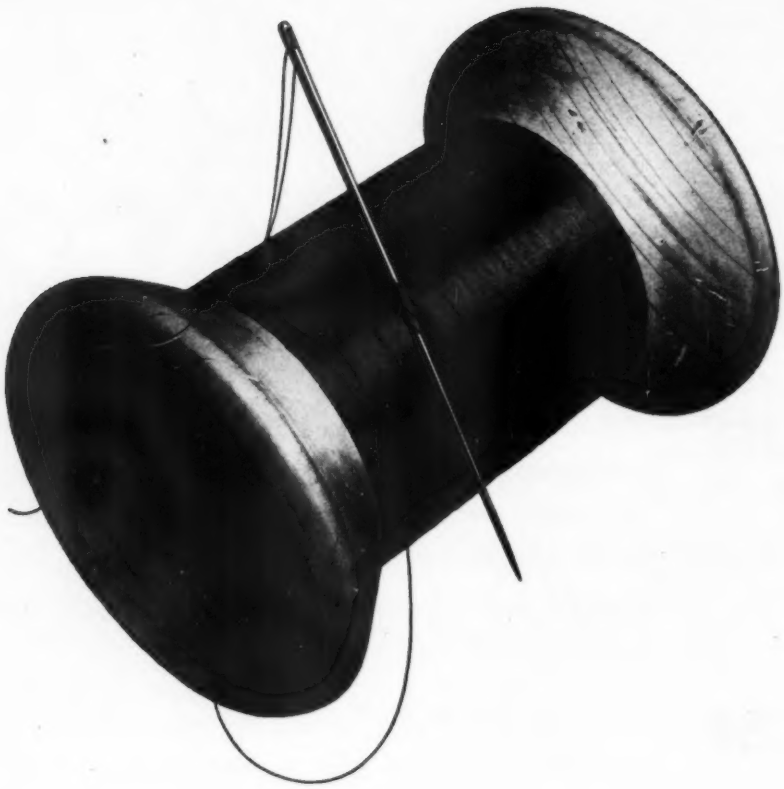


Tailored to suit our customers' needs

AS A MAJOR PRODUCER of line pipe, Kaiser Steel's operations are tailored to suit your needs on every count.

As the West Coast's only integrated *independent* steel plant, Kaiser Steel controls quality *completely and rigidly* at every step.

Kaiser Steel's mill at Fontana, and Basalt-Kaiser facilities at Napa, California, now produce a *complete* range of diameters in lengths up to 55 feet. Thus Kaiser Steel can meet practically every transmission pipe requirement of the petroleum, gas and water industries in the western two-thirds of the nation.

Combine this with a record for dependability that is unsurpassed in the industry and you have the answer to why experienced line men consistently rely on Kaiser Steel!

It's good business to do business with

Kaiser Steel pipe to latest API and ASTM specifications is produced in diameters from ⅛ inch to 30 inches, and in lengths up to 55 feet. Shipping points are Fontana and Napa, California.

Kaiser Steel

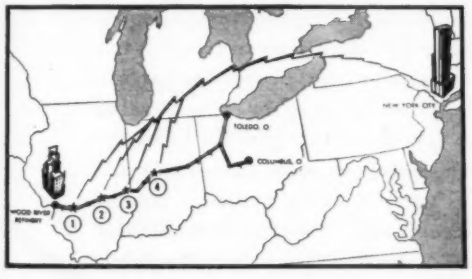
KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 22" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅝" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	24" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • KAISER STEEL CORPORATION Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

With no station operator needed, G-E switchgear (right)—containing main motor starters, relays, and meters to indicate pressure and load—activates station pumping operations in proper sequence on teletyped signals from central dispatcher (top left).

AUTOMATIC pumping-station operation!



From almost halfway across the country, central dispatcher in New York's Radio City controls flow of 22 different products through 4 new booster stations in Illinois and Indiana. Thanks to the combined efforts of Shell, A.T. & T., and G-E engineers, line capacity is now up by 168,000 gallons a day, with man-hour needs kept to a minimum.

G-E engineering and equipment in 4 new remotely-controlled Shell stations help boost line capacity, cut man-hour costs

A central dispatcher in New York dials some code numbers. Hundreds of miles away—in one of four new booster pumping stations on Shell Oil Co.'s East Products Pipeline—General Electric switchgear, control, and accessory equipment goes into action. In proper sequence, motorized valves are opened and closed, pump motors started and stopped, operating reports sent, or the station's single maintenance attendant summoned for an emergency—all automatically!

G-E engineering and equipment—which played a major part in this first application of long-distance automatic remote control to pipeline stations—can help electrify *your* pipeline as well for higher throughput, lower costs. Your G-E representative will gladly show you how. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

Everything you need to cut oil pipeline costs —ELECTRICALLY!

GENERAL ELECTRIC

661-24

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MAINTENANCE-FREE

pipe line motion control is yours

...with CMH EXPANSION JOINTS

There's no longer any need to spend time and money on periodical maintenance of expansion joints. You can install CMH corrugated expansion joints and forget them . . . there's no packing to pull up or replace. In CMH expansion joints, the curvature of corrugations serves to minimize internal stresses and to provide balance of working stresses. This design coupled with advanced forming methods developed through years of research and experience assures long, trouble-free service. For a new installation or for replacement of obsolete equipment, specify CMH expansion joints for the practical, dependable answer to control of axial, lateral or radial motion in piping.

The illustrations show three typical installations of CMH Controlled-Flexing Expansion Joints.

A CMH TYPE to meet every need

CMH EXPANSION JOINTS are made as Free-Flexing for pressures up to 30 psi, Controlled-Flexing for pressures up to 300 psi and Flexoniflex for pressures up to 1500 psi, temperatures to 1600° F. Sizes range from ⅜" to 30" I. D. and larger. Available in copper, stainless steel or other alloys with flanged or welding ends.

Flexon identifies CMH products that have served industry for over 48 years.

CHICAGO METAL HOSE Corporation

1345 S. Third Avenue • Maywood, Illinois • Plants at Maywood, Elgin and Rock Falls, Ill.
In Canada: Canadian Metal Hose Co., Ltd., Brampton, Ont.

CMH

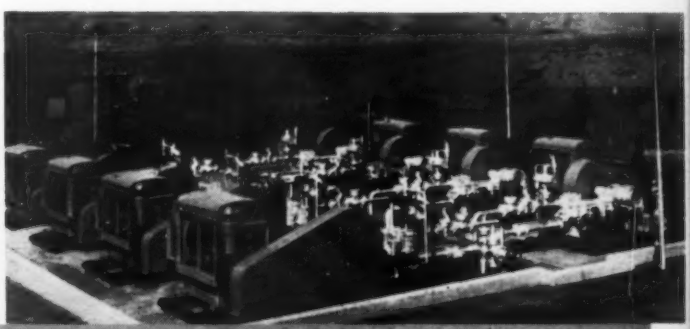
ONE DEPENDABLE SOURCE
for every flexible metal hose requirement

Convoluted and Corrugated Flexible Metal Hose in a Variety of Metals • Expansion Joints for Piping Systems
Stainless Steel and Brass Bellows • Flexible Metal Conduit and Armor • Assemblies of These Components

There's no guide like experience!

Consult the oldest, most progressive, most successful companies in the pipeline field—men whose knowledge of pumping performance comes from experience. Ask them what they have found out about Gaso Pumps. You'll find in their statements the secret of Gaso supremacy in portable pumping units.

SAY GASO AND BE SURE!



GASO PUMPS

for every oil industry need

GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.
EXPORT OFFICE: 149 BROADWAY, NEW YORK

Shreveport, W. L. SOMMER CO., 419 Lake Street • Los Angeles: 2529 Chambers St., Vernon • Western Canada: Lufkin Machine Co., Ltd., Edmonton, Alberta

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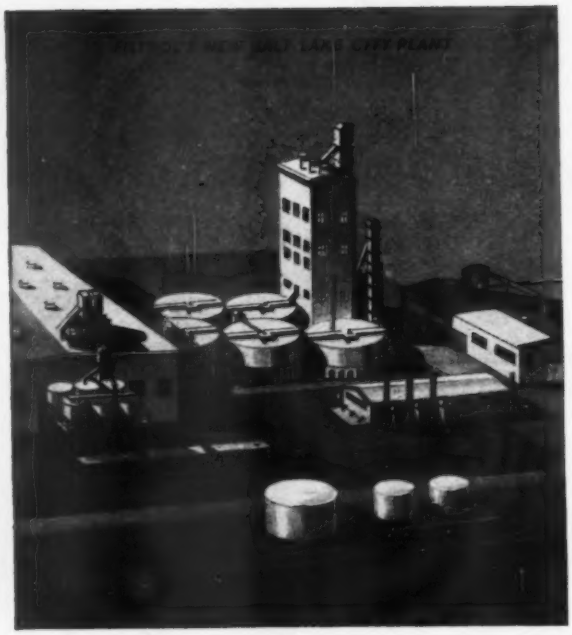

More Filtrol* catalyst available...

TO MEET THE GROWING DEMAND FOR FILTROL CRACKING CATALYSTS, FILTROL CORPORATION HAS COMPLETED A NEW PLANT AT SALT LAKE CITY FOR PRODUCTION OF CATALYSTS.

THESE NEW PRODUCTION FACILITIES SUPPLEMENT FILTROL'S OTHER PLANTS AND GREATLY INCREASE THE AVAILABILITY OF EFFICIENT, LOW COST CATALYSTS FOR REFINERS EVERYWHERE.

OTHER
REASONS FOR USING
FILTROL CATALYSTS

1. HIGHER OCTANE BARRELS
2. HIGH BUTYLENE YIELD
3. LOW COST
4. SULPHUR RESISTANT CATALYSTS
5. FASTER REGENERATION RATE
6. LOW ATTRITION RATE
7. TECHNICAL SERVICE
8. UNIFORMITY
9. LOWERED EXCESS BUTANE

FILTROL CORPORATION

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PLANTS: VERNON, CALIF.; SALT LAKE CITY, UTAH; JACKSON, MISS.

Filtrol -CATALYSTS AND ADSORBENTS

*T. M. REG. U.S. PAT. OFF.

Completely Revised!

DATA ON HIGH-TEMPERATURE ALLOYS

This new edition of "HAYNES Alloys for High-Temperature Service" summarizes all the available data on 10 super-alloys. Besides physical and mechanical properties of two newly developed alloys — HAYNES alloys Nos. 25 and 36 — the booklet now includes additional data on all 10 alloys.

There are tables and charts giving data on creep-rupture, stress-rupture, thermal expansion, stress-elongation, hardness, and impact properties, in addition to chemical composition and short-time tensile properties. The booklet also contains information on age-hardening and procedures for fabricating the wrought forms of the alloys.

Every engineer and metallurgist who designs or specifies equipment for service at elevated temperatures should have a copy of this book. Design engineers, particularly, will find it a useful guide in the selection of alloys to meet the exacting requirements of high-temperature service.

Fill in the handy coupon below if you wish a copy of this useful book. If you have the old edition, be sure to replace it immediately, so that you will have all the latest information available on the HAYNES high-temperature alloys.

HAYNES Trade-Mark *Alloys*

Haynes Stellite Division
Union Carbide and Carbon Corporation
UCC

USE THIS HANDY COUPON

Haynes Stellite Division, UCC, 737 S. Lindsay Street, Kokomo, Ind.
Please send me, without obligation, a copy of "HAYNES Alloys for High-Temperature Service."

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COMPANY_____
ADDRESS_____

"Haynes" is a trade-mark of Union Carbide and Carbon Corporation.

HOW IT WORKS

Supersonic waves are sent into the material under test. Upon reaching the other side, or upon reflection by a discontinuity, the waves return to their source and are then converted into a high-frequency potential. This potential is amplified by electronic circuits and projected upon the screen of a cathode-ray tube where they may be seen and examined.

Pulse pattern, showing the initial pattern at the extreme left and the reflection from the opposite side at the extreme right. The sweep line indicates no defects.

A typical indication of a defect is illustrated here. By means of calibration, it is now possible to determine both the exact position of the flaw, as well as its size.

Today, Supersonic testing is available on specification for inspecting Grinnell prefabricated piping. By observing the pattern produced by the electron beam on the fluorescent screen, any defects in the base metal, welds, or variations in pipe thickness can be located and measured at a glance.

Grinnell's ultra modern electronic testing can be relied upon to detect hidden flaws in pipe materials, to check unerringly the quality of welds where it picks up types of flaws not revealed by X-ray and gamma ray inspection. In examining bends, this type of testing can measure the degree to which bent pipe thins on the outside and thickens on the inside of the bend, assuring full specified thickness in high temperature, high pressure work.

Non-destructive Supersonic testing is another in a constant succession of new techniques employed by Grinnell to provide prefabricated piping which is safe and dependable . . . which measures up in every way to *rigid* state, national, association and insurance code requirements. It is another reason, too, why it will pay you to think of Grinnell "Whenever Piping Is Involved".

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WHENEVER PIPING IS INVOLVED

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They Say—

The Depletion Allowance

"The business of exploring for and discovering oil and gas is extremely hazardous. For example, approximately one-third of all wells drilled in the United States in 1949 were dry holes. . . .

"Elimination of or any substantial reduction in the present depletion allowance would strike a crippling blow at oil and gas privately managed and financed exploratory efforts and thus at their production and availability for use in the critical months and years ahead. . . .

"The producer sells his capital assets just as if you were to dispose of your home by selling one brick from it each day. . . .

"The manufacturer does not have to build numerous factories to find one to make his product. The merchant does not have to build numerous stores before he finds one from which he can sell his merchandise. But the average producer of oil and gas must, of necessity, drill numerous dry holes to discover wells that produce. . . .

"Unless it can be demonstrated that the proposal (to cut depletion allowance) would help increase production it should be rejected despite other considerations which, at other times, might be desirable, for our national survival depends on industrial production."

—Robert G. Dunlop, president, Sun Oil Co.

New Tidelands Viewpoint

". . . Trustworthy reports say that both the Interior Department and the Justice Department, the two federal units concerned with the subject (tidelands administration), lean toward agreement upon a formula which would grant to Texas and the other coastal states 37½ per cent of the oil revenues from lands off their respective shores, with the federal Government retaining 67½ per cent. This means that the states would share in returns from royalties, rentals, and lease bonuses not only from the areas they fought a losing fight to retain, but from the entire seaward area to the edge of the Continental Shelf.

"It is entirely possible that by such an arrangement Texas would actually gain more in future revenues than if its ownership of the submerged area within the 10½-mile limit—the original boundary of the state—had been confirmed. The reason for this is that explorations so far made indicate that a great deal more oil exists beyond the 10½-mile limit than inside it. If these estimates are accurate, eight times as much oil might ultimately be recovered outside this line as within it."

Editorial in the Fort Worth Star-Telegram.

Why a Conservation Law?

"California's oil and gas resources are irreplaceable; California's oil and gas resources are essential to the people of California, of the Pacific Coast, and of the nation, particularly in times such as these, when national strength is vital to national existence.

"No one, within the industry or without, argues that it is immaterial whether California's oil and gas resources be conserved. The question is not: 'Shall there be conservation of California's oil and gas resources?' But: 'How can the conservation of California's oil and gas resources be assured, with fairness to those in the industry and full protection of the public interest?'

"Oil Producers Agency, the San Joaquin Valley Oil Producers Association, and the Independent Refiners Association believe that the only possible way is through the enactment of an adequate, proper, and comprehensive state-conservation law.

"Oil Producers Agency is sponsoring a state oil and gas conservation law in the hope and belief that when the true purposes of such a law are known and understood, the people

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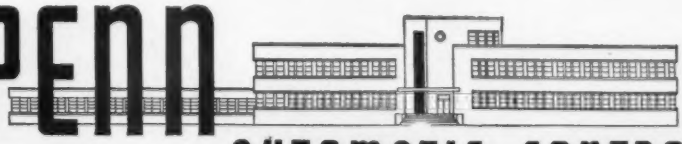

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of California will demand its enactment to protect their interest in the irreplaceable oil and gas reserves of the state.

"Only within the framework of proper legislation can the industry put into effect those modern practices which lead to the greatest ultimate recovery of oil and gas from the state's reserves, in the best interests of the people of the state, the Pacific Coast, and the nation."

—*The Independent Oil Producer, published by Oil Producers Agency of California, Los Angeles.*

CALENDAR

1951

February

American Society for Testing Materials, Committee D-2 on Petroleum Products and Lubricants, Shoreham Hotel, Washington, D. C., February 4-9.

New York Oil Heating Association, Inc., Hotel Statler, New York, February 5.

Missouri Petroleum Association, annual convention and trade exhibit, President Hotel, Kansas City, Mo., February 5-7.

American Institute of Electrical Engineers, Tulsa Section, meeting on explosion-proof electrical equipment, Michaelis Cafeteria, February 8.

American Geophysical Union, twenty-sixth regional meeting, Fresno State College, Fresno, Calif., February 9-10.

American Institute of Mining and Metallurgical Engineers, annual meeting, Jefferson and Statler hotels, St. Louis, February 19-22.

Kentucky Petroleum Marketers Association, annual meeting and trade show, Brown Hotel, Louisville, February 20-21.

Kansas-Oklahoma Water Flood Operators, monthly meeting, Booth Hotel, Independence, Kans., **February 21.**

National Association of Corrosion Engineers, Tulsa Section, Short Course on Practical Control of Pipe-Line Corrosion, Mayo Hotel, February 21-23.

Missouri School of Mines and Metallurgy, water-flooding symposium, Rolla, Mo., February 23.

Iowa Independent Oil Jobbers' Association, Inc., annual convention, Hotel Fort Des Moines, Des Moines, February 21-22.

Wisconsin Petroleum Association, annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 27-28.

San Joaquin Valley Oil Producers Association, annual meeting, Bakersfield Inn, Bakersfield, Calif., February 28.

March

American Association of Petroleum Geologists, Rocky Mountain Section, Shirley Savoy Hotel, Denver, March 1-2.

New York Oil Heating Association, Inc., Hotel Statler, New York, March 5.

American Society for Testing Materials, spring meeting and committee week, Cincinnati, March 5-9.

American Petroleum Institute, division of production, southwestern district meeting, Hotel Beaumont, Beaumont, Tex., March 7-9.

Indiana Independent Petroleum Association, spring convention and refiners and suppliers exhibit, Hotel Severin, Indianapolis, March 8-9.

Texas Oil Jobbers Association, Inc., spring convention and refiners and suppliers exhibit, Shamrock Hotel, Houston, March 9-10.

Mid-West Gas Association, Hotel Fontenelle, Omaha, March 12-14.

First South American Oil Congress, Montevideo, Uruguay, March 12-16.

Illinois Petroleum Marketers Association, annual convention, Sherman Hotel, Chicago, March 13-15.

National Association of Corrosion Engineers, annual conference and exhibition, Statler Hotel, New York City, March 13-16.

Gas Appliance Manufacturers Association, annual meeting, The Homestead, Hot Springs, Va., March 19-21.

Ohio Petroleum Marketers Association, annual convention and marketing exposition, Deshler-Wallick Hotel, Columbus, Ohio, March 20-22.

American Petroleum Institute, division of production, Mid-Continent district spring meeting, Herring Hotel, Amarillo, March 21-23.

North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex., March 24.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30

April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

American Society of Mechanical Engineers, spring meeting, Atlanta, April 2-5.

Oil-Heat Institute of America, annual convention and National Oil-Heat Exposition, Navy Pier and Palmer House, Chicago, April 2-6.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of production, Eastern district meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 3-5.

Midwest Power Conference, fourteenth annual meeting, Sherman Hotel, Chicago, April 4-6.

New York Oil Heating Association, Inc., Hotel Statler, New York, April 9.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Michigan Petroleum Association, annual spring convention, Detroit Leland Hotel, Detroit, April 10-11.

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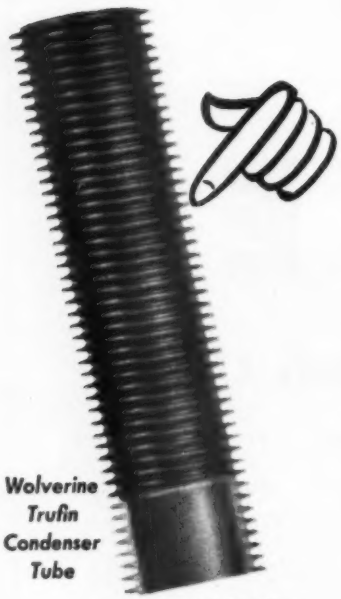

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. . . that it is available in the same alloys as plain surface condenser tube?

. . . that it provides an economical substitute for plain surface tube in many applications?

. . . that it has generally less pressure drop on the fin side than plain tubes on the same center distance?

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Course, University of Oklahoma, Norman, April 10-12.

American Institute of Electrical Engineers, District 4 meeting, McFadden-Deauville Hotel, Miami, April 11-13.

American Gas Association, distribution, motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Brussels International Fair, twenty-fifth annual event, Brussels, Belgium, April 21-May 6.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, joint annual meeting, Jefferson Hotel, St. Louis, April 23-26.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

Interstate Oil Compact Commission, spring meeting, La Fonda Hotel, Santa Fe, N. M., April 26-28.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

Materials Handling Conference, International Amphitheatre, Chicago, April 30-May 4.

May

American Institute of Electrical Engineers, District 1 meeting, Hotel Syracuse, Syracuse N. Y., May 2-4.

New York Oil Heating Association, Inc., Hotel Statler, New York, May 7.

American Gas Association, Natural-Gas Department, Dallas, May 7-8.

Independent Petroleum Association of America, mid-year directors' meeting, Cosmopolitan Hotel, Denver, May 7-8.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 7-10.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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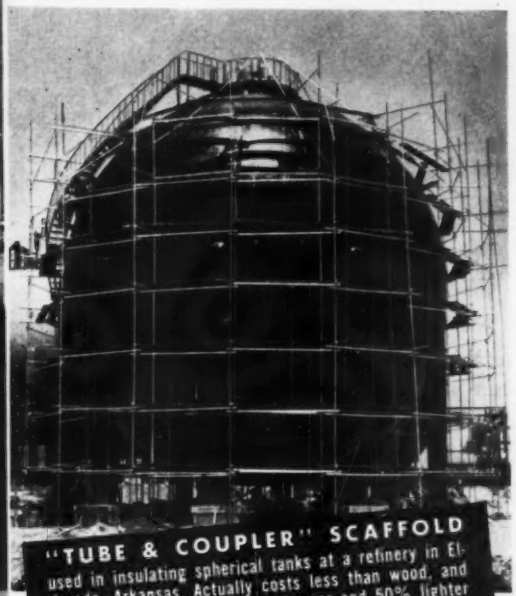

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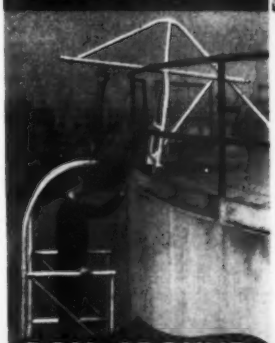

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JOURNALLY Speaking

Tops Again

AFTER a heart-rending struggle between the staff's collective pride and its modesty, we have decided to admit in print that our favorite oil publication is still the biggest magazine of any kind in the world.

We wouldn't make such a boast idly or on our own hook, but the secret already has been revealed by Advertising Age, a magazine which keeps close tabs on periodicals of all kinds. It measures magazines by the number of pages of advertising carried, and for the second successive year it finds that The Oil and Gas Journal is at the top of the list.

Here is the 1950 score of the biggest magazines, in the order listed by Advertising Age: The Oil and Gas Journal, 6,432 pages; Iron Age, 5,723 pages; Steel, 4,700 pages; American Machinist, 4,630 pages; Saturday Evening Post, 4,423 pages; Engineering News Record, 3,838 pages; Life, 3,814 pages.

It may surprise some that several business papers are bigger than the popular weeklies, though it must be remembered that the latter have far larger circulation and charge a lot more per page of advertising. But it should surprise none of our readers that an oil paper is the biggest of all because the petroleum industry is so big and is expanding so rapidly that it constitutes the biggest industrial market in the world.

And naturally the Big Yellow Book, which gives its readers the mostest of the bestest 52 times a year, is recognized as the best medium for selling things to the petroleum industry. Many of our readers say (and this makes our editors wince) that the advertisements are the best part of our book.

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IT'S not very often that you can get something for nothing out of our Circulation Department, but here's your annual opportunity.

Simply for the asking you can get the 1950 index to The Oil and Gas Journal. It's a 48-page booklet and this year it's printed on slicker paper than before. It lists all the articles, features, and the longer news stories which our favorite oil publication ran last year, but even 48 pages of fine print couldn't list all the individual short "squibs," newsy and useful though they were. A great many of our readers already have asked for copies and the supply is not inexhaustible, so act now if you want one.

There are various decimal classification systems for indexing scientific and other published material, but we figured these are a bit too intricate and formidable for most of our readers so our index uses a very simple method of grouping the titles of articles. It employs the words and arrangements common to the oil man's vocabulary. For instance, under the general topic of Refining are such subdivisions as corrosion, instrumentation, petrochemistry, plant practices, and safety. Professional librarians might prefer something fancier, but we feel that this off-the-cuff method is best suited to our busy readers.

Incidentally, if you ever want to locate our favorite oil publication in a big library, go to the section of the stacks bearing the numbers 050. That's our Dewey Decimal classification number.

Repeaters

TWICE a year all publications of good standing file sworn circulation statements for public inspection. Our own statement for the last half of 1950 is now available for anyone who wants to see the geographic and occupational breakdown of our circulation.

Of special interest and pride in our shop is the figure on renewal percentage, which shows that 79.53 per cent of our readers renewed their subscriptions. This is about our usual score, but it's considered very, very good for any sort of a publication. When you consider that people die, or retire, leave the industry, or change their jobs, a renewal rate of about 80 per cent is just about the highest that could be expected. If our customers weren't pretty well satisfied with the fare we dish out to them they wouldn't keep coming back for more like this year after year.

Also, every single one of these readers paid for his subscription. There is no such thing as a free subscription to The Oil and Gas Journal.

—*Henry D. Ralph*

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OIL WELLS CAN BE ORNERY TOO

Being ornery and unpredictable is a valuable trait in a rodeo bronc, but a mighty expensive condition in an oil well. And oil wells do seem to act pretty ornery sometimes when you try to perforate the casing with out-dated methods that give uncertain penetration and leave an unknown condition at the pay zone. However, for the many progressive operators who have standardized on the modern Welex Jet process for *every* perforating job, such problems are practically a thing of the past. More than half the casing perforating done in the U. S. today is done by the Jet method originated by Welex. The record of results in the thousands of wells Jet perforated proves that Welex gives you *300% deeper penetration* than any other practical method, and provides a *known hole density per foot,* with *no fracturing of the cement sheath.* Results cost less with Welex Jets. Call your nearest Welex Station for prompt service day or night.

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XUM

44,000 Wells

A total of close to 44,000 new wells is now generally accepted as the desirable goal for the petroleum industry this year. The Journal's detailed survey of operators' plans, published last week, shows 43,843 wells scheduled, and this probably could be exceeded should steel be available.

A promise that the industry will get enough steel for 44,000 wells has been made by Washington authorities. That is, the Petroleum Administration for Defense has said that the industry should get this much and the National Production Administration has agreed to try to provide it. So far, so good, but the industry is interested in immediate action.

Perusal of the Washington dispatches in this and other recent issues of the Journal raises a question whether the defense machinery is yet sufficiently organized to make good on any sort of promise. Almost every week, it seems, new administrative elements enter the picture and the lines of authority and policy making are reshuffled.

Over-all demands for steel are greater than the supply, and those who know say that no industry can be assured of a definite quantity until a controlled-materials plan is set up and that this cannot be done for several months. Now the White House has created what appears to be a top-level and separate investigating body to make a long-range study of the materials needs of the petroleum and other industries.

If it takes 6 months or so for official Washington to agree that the industry must have the steel for 44,000 wells this year, the country may as well brace itself for an oil shortage before very long. At the outset of World War II, defense officials looked with complacency on our reserve crude-producing capacity, and the drilling of new wells was put off until almost too late.

This figure of 44,000 wells was not pulled out of a hat. It is what the industry knows it must do to keep abreast of definitely increasing demands. The gratifying increase in proven underground reserves last year can be attributed almost entirely to the record number of wells drilled. But this margin of safety can dwindle rapidly with demand at such a high level. The only way to maintain it is to drill, and it is significant that the increase in the scheduled drilling program for 1951 is entirely in wildcat operations.

The 44,000-well program is not just what the industry would like to do, not just what it would be pleasant for the country to have, not an extravagant precaution for a hypothetical need. It is a closely figured essential for meeting the nation's oil needs as they exist today.

In the light of World War II experiences in oil shortages and in "trading steel for oil" it is difficult to see why defense officials need to make long-range studies or perfect an ideal allocation system before making certain that the oil industry will drill its 44,000 wells.

XUM

THIS WEEK

OCTANES—PAD, refiners discuss both sides of argument on agency's proposed ceiling on octane of motor fuel to provide a stockpile of tetraethyl lead compound. . . . ¶Proponents don't think average motorist will be put to disadvantage over lowering TEL content but opponents to plan want rationing of product to assure present octane levels. . . . ¶PAD says it must act to aid small refiner who has trouble meeting present octane standards with small-scale, outdated equipment. . . .

STEEL—Petroleum Administration's request for 1,890,000 tons of tubular goods for oil industry approved by NPA, with high percentage earmarked for drilling of new wells. . . . ¶No specific assignments made on how much will go for foreign operations, but PAD officials think most of export quota will go to Latin America. . . . ¶NPA asked to make study on what materials, capital will be required to increase oil-products output in Western Hemisphere by 1,000,000 bbl. daily. . . .

PRODUCTION—Elk Hills Naval Reserve may prove to be California's ace-in-the-hole in substantially increasing state's crude-oil production. . . . ¶Tulsa firm purchases active water-flood project in North Johnson pool in Clark County, Illinois. . . . ¶Louisiana sets record allowable for February of 638,285 bbl. daily. . . . Kansas' production to remain stationary at 300,000 bbl. daily next month. . . . ¶Green's Lake pool in Galveston County, Texas, revived with new-pay finds after development lapse. . . .

L.P.G.—Industry being invaded by growing movement toward adaptation of motor vehicles to propane and butane. . . . Many West Texas trucking companies convert fleets, praise more efficient operation, longer service between overhauls. . . . ¶Plans made known for construction of new natural-gasoline plant and addition of more gas-gathering facilities in Elk Hills field of Kern County, California. . . .

WASHINGTON—President institutes an investigation of his own on future supply and demand for petroleum and other vital commodities. . . . ¶William H. Harrison of NPA named Defense Production Administrator. . . . ¶Treasury Department expected to make new effort to eliminate or reduce present 27 per cent depletion allowance for oil and gas producers. . . . ¶General price freeze will have little effect on oil industry, since it has been adhering to previous December 18 order of ESA. . . . ¶Carborundum Co. president appointed vice chairman of reorganized Munitions Board. . . .

TECHNOLOGY—American refiners may learn much from experience of British on problems facing industry as jet-plane output increases. . . . Jet-fuel situation has reached advanced stage in Britain. . . . ¶Navy reports progress being made in search for more economical jet-airplane engines with successful tests of powerful new engine. . . . ¶Chrysler Corp. announces new 180-hp. V-8 engine which it claims will give superior performance on regular-grade commercial gasoline, resulting in more economy. . . .

CANADA—Export of natural gas from Alberta is banned by provincial government on grounds reserves are not sufficient to allow shipment from region. . . . But way is kept open for possible export should reserve estimate be increased by new exploration and development. . . . ¶Canadian Gulf pays 1½ million dollars plus 15 per cent royalty bonus for a Crown Reserve quarter section near Golden Spike field well. . . . ¶New petrochemical plant to be constructed at Montreal. . . .

ACTIVITY—Crude production for week ended January 27 averaged 5,989,190 bbl. daily, up 27,140 bbl. daily from previous week and 1,113,325 bbl. daily from same week last year. . . . ¶Total completions for the week amounted to 837 wells compared with 662 for same week last year. . . . Wildcat completions totaled 174 wells, down 23 from last week but up 82 from last year. . . . ¶Rotary rigs operating in United States on January 22 dropped 92 rigs from previous week to 2,055. . . .

TRENDS—Refinery operations reached all-time high for week ended January 20. . . . Crude runs for the week averaged 6,505,000 bbl. daily or 117,000 bbl. daily greater than previous high. . . . ¶Latest record represents increase of 992,000 bbl. daily over same week last year. . . .

ACE-IN-THE-HOLE.—About the only field left which offers any opportunity of substantially increasing California's crude-oil production is Elk Hills Naval Petroleum Reserve in Kern County, where a 14,000-ft. test is now drilling below 8,440 ft. Geologists and engineers think that the field could contribute much in helping to alleviate the shortage which has been brought about due to heavy military demands.

Octane Cut

Both sides of argument heard by PAD at meeting with refiners on proposed cut of TEL content in motor fuel

Bertram F. Linz

WASHINGTON.—Petroleum Administration officials held a lengthly meeting with refiners January 25 to discuss the proposed order to save tetraethyl lead *(The Oil and Gas Journal, January 18, 1951, page 31)* and heard everyone who wanted to speak, but left the conference unconvinced that any feasible alternative to ceiling on octane ratings could be developed.

Deputy Administrator Bruce K. Brown said, however, that the record, the briefs filed by several companies, and suggestions made during and after the meeting will be carefully studied before any order is issued.

Brown added that a number of recommendations regarding administrative provisions had been offered, some of which undoubtedly will be incorporated in the order. These, he indicated, may include one which would prohibit an increase in quality to meet the ceiling by a refiner who has been making gasoline of lower quality.

He pointed out that the octane value of house-brand gasoline in California has been one point under the proposed ceiling and said that to permit increases in quality would defeat the purpose of the order to save TEL for a stockpile.

Refiners attend.—More than 130 refiners and others interested attended the meeting, at which the opposition to the order was led by Sun Oil Co.'s president, Robert G. Dunlop. He questioned whether it would save any TEL and proposed instead that PAD ration it, letting each company handle its problem as best it could, and setting aside a pool from which distressed refiners could be supplied with enough of the material to keep them in competition.

Sun's position was supported by five other companies and Empire State Petroleum Association, but by far the largest number of companies which sent representatives to the meeting or had advised PAD of their position offered no opposition to the ceiling proposal, which Brown said was patterned along the line of the system followed during World War II.

Refiners whose opinions have been submitted to PAD fall into several categories—those who have no objection to the proposed order; those who have no objection to the imposition of octane ceilings but believed they should be lower than proposed; those favoring regional ceilings; those proposing direct rationing of TEL without ceilings; those opposed to direct rationing; and those opposing the establishment of an intermediate grade of gasoline.

Views outlined.—The views of PAD were outlined to the meeting by Brown, who explained that it was felt that while the order will lower present octane specifications in some areas and not in others, there were several points which made that method appear most feasible.

"First," Brown said, "we have a duty to the public not only to save critical materials like tetraethyl lead but also to make sure that, as far as motor fuel is concerned, such automobiles as are manufactured and made available to the public can be designed and made in consonance with a nation-wide, uniform standard of the quality of fuel to be used in those cars. In the last analysis, no automobile engine can be successfully designed to use one quality of fuel in one part of the country and a different quality in another.

"Second, except for the question of altitude (for an automobile engine does not need as high an octane-number fuel at high altitudes as at low ones), the relative needs of gasoline consumers in all parts of the United States are the same and we want to try to treat them the same.

"Third, if a further reduction in octane numbers is required in the future to meet the needs of the defense program, the complaints that refiners serving some areas are being discriminated against will disappear."

Small refineries.—Brown told the meeting, further, that Secretary Chapman has insisted that any order to reduce TEL consumption must not place small refiners at a disadvantageous position and, he pointed out, "if, as some have proposed, we should attempt to reduce over-all consumption by requiring each refiner to cut his purchases of tetraethyl lead by a specified uniform percentage, the effect would be to force some refiners out of the business of making premium gasoline at all.

"This is so," he explained, "because the larger refiners, who operate the most modern types of cracking equipment, can, by making various adjustments in the refining process, produce the premium-grade gasoline with smaller amounts of tetraethyl lead than are needed by the smaller refiners to produce the same quality of fuel."

Not temporary.—Brown emphasized that the proposed cut in octane numbers is not a temporary one, as appears to be the impression in some quarters, and indicated that further restrictions might have to be adopted in the future.

"Rising demand for gasoline, both for military and for civilian purposes, may increase the demand for antiknock agents faster than construction schedules and raw-material availabilities will permit increases in national production of tetraethyl lead," he said. "We don't pretend to know the answer, but we are not too optimistic."

The deputy administrator held, too, that the order will save TEL "as rapidly as can be done in an orderly, economic way, in view of present storage limitations," and the saving, he pointed out, will be insured by directives to the TEL manufacturers to restrict their shipments to refiners.

Rationing proposed.—Answering the proposal that a rationing system be substituted for octane ceilings, Brown told the meeting he would like the refiners' views on the action to be taken on the application of a refiner for TEL from the "distress" pool. Should PAD, he asked, give the refiner all the TEL he asked; or sufficient to make gasoline of the same octane quality he produced before the order; or enough only to make gasoline of the same quality as his competitors and, if so, should that be based on the quality of his top competitor, on the average of the top four or the average of the whole group.

"We have not been able yet to see our way through to any system that does not include the principle of octane ceilings," Brown said.

Steel Breakdown

Estimates given on how much will be sent abroad

WASHINGTON.—The Petroleum Administration's estimate of 128,000 tons of steel "plus or minus" for foreign operations this year out of the total of 1,890,000 tons of tubular goods for oil and gas production which has been earmarked by the National Production Authority, was explained this week as representing the best breakdown that could be made at the moment of what the requirements of American oil companies operating abroad may be.

There has been no specific assignment of the material to Latin America, the Middle East, or other areas, but PAD officials said the greater part of the export total undoubtedly will go to Latin America.

By setting its figures for both do-

mestic and foreign operations on a "plus or minus" basis, PAD has left the way open for using its best judgment in determining whether more or less of the 128,000 tons can be applied better to foreign or domestic operations. The same reservation with respect to the 1,762,000 tons for domestic operations would permit the diversion of additional tubular goods to foreign operations if such action became necessary.

Other supplies.—At the present time, a large proportion of the material used for foreign operations is being supplied by mills in Britain, Belgium, France, Germany, Italy, and Luxembourg, and so long as that movement continues it is expected that demand for domestic steel will be light, but it was pointed out there is no way of knowing how long the movement from Europe will continue.

Bruce K. Brown, PAD deputy administrator, said he was in favor of the construction of the Iraq Petroleum Co. pipe line for which the Office of International Trade has granted export licenses for pipe over the protests of domestic interests, but refused to enter into any detailed discussion of Middle East oil.

New consultant. — John Boatwright, of Standard Oil Co. (Ind.), has been brought to PAD as a consultant to head up a study of transportation, and Brown said he hoped within a few days to announce the appointment of directors for the foreign and refining divisions.

Brown said consideration has been given to the possible need to set up regional offices, but indicated PAD may first try out the dispatching of specialists to points where specific problems arise as a more economical method until conditions develop that require the establishment of permanent district agencies.

Materials Study Asked

NPC may make study of material, capital required to raise products output in this hemisphere by 1,000,000 bbl. daily

WASHINGTON.—The National Petroleum Council was asked this week to make a study of the materials and capital that would be required to increase the output of oil products from Western Hemisphere sources by 1,000,000 bbl. a day.

At the same time the council, at its first 1951 meeting, was told the National Production Authority had approved the Petroleum Administration's program for 1,890,000 tons of oil-country tubular goods, the highest per cent of which will be set aside for exploratory drilling, and will set up procedures that will insure the start of production at that rate during the second quarter of this year.

PAD officials said that this production will require steady-capacity operation by the pipe mills which it is estimated will have a surplus of only around 60,000 tons over the industry's requirements, which is hardly enough to cover breakdown time.

A Petroleum Administration for Defense, paralleling the Petroleum Administration for War as closely as the Defense Production Act permits, is provided for in a new departmental order outlined to the council by Interior Secretary Oscar L. Chapman. The new order specifically provides that PAD shall operate "separately from, independently of, and outside the jurisdiction or authority of any officer or employe of the Department of the Interior except the secretary."

Chairmanship question. — Chapman also told the council he has written a letter to the Department of Justice and will personally confer with Atty. Gen. J. Howard McGrath on the question of a nongovernmental chairman for NPC. Under a ruling by the department and an order issued in conformity, all industry-advisory committees are required to be presided over by a full-time government official, but Chapman is attempting to secure an exception for NPC which he does not consider an advisory committee in the sense that term is used in the law.

The secretary disclosed that PAD will continue to handle all problems of gas as well as of oil but he is considering the appointment of a separate council to deal with problems involved in the transmission and distribution of gas. If such a council is set up, he pointed out, it will render unnecessary any extensive changes in the makeup of the NPC.

Production study.—The request that the council study the cost of increasing Western Hemisphere production was based on the fact that in the event of war, military and civilian demand would require much greater crude output than is now available.

An additional 1,000,000 bbl. daily, it was explained, would require a corresponding increase in refinery capacities, additional transportation facilities, and large but unmeasured amounts of steel and equipment for finding and developing additional fields. The council is to calculate the cost, both in money and materials, to achieve that increase in four increments of 250,000 bbl. each.

Depletion allowance.—NPC members saw in the department's interest in increased potential production strong support for continuance, unchanged, of the percentage depletion allowance if, as expected, it is attacked by the Treasury this month when the House ways and means committee resumes its tax hearings.

They also saw in it a movement to some decisions for development of the offshore reserves of the Gulf of Mexico, and in that connection, as the council was meeting, the Senate interior affairs committee agreed to hold these hearings in the near future on the O'Mahoney bill for interim administration of the submerged lands by the Interior Department pending the enactment of permanent legislation.

Various efforts are being made both in Texas and Louisiana seeking approval of some sort of interim agreement whereby the oil companies can go ahead and operate on submerged lands, in view of the fact that the companies have spent heavily on offshore equipment and this equipment must be kept in use in order to make a satisfactory return on investment.

The council also was asked to make a detailed study of the demands by states for liquefied petroleum gas during the past 2 months, to provide information for use in the event the L.P.G. situation becomes increasingly acute, and to develop the facts regarding the manpower requirement for the petroleum and gas industries and make recommendations for fitting those industries into the over-all plan for most effective use of the nation's manpower.

New Oil Study

President institutes an investigation on his own

WASHINGTON.—President Truman took the ball last week from congressional committees which over the past several years have been seeking to determine future supply and demand for petroleum and other vital commodities and launched an investigation of his own, to be conducted by a Materials Policy Commission headed by William S. Paley, chairman of the board of Columbia Broadcasting System.

The commission is to study "the broader and longer-range aspects of the nation's materials problem as distinct from the immediate defense needs" and report within the next 6 to 9 months.

Crucial problem.—"This is one of the crucial problems facing the nation," the President wrote. "By wise planning and determined action we can meet our essential needs for military security, civilian welfare, and the continued economic growth of the United States.

WATCHING WASHINGTON

Bertram F. Linz

Alaskan Suspension

Suspension "for the duration" of the Navy's exploration of the Alaskan petroleum reserve is expected to be suggested by the department itself this spring when the question of further appropriations for the work comes up in Congress.

The reasons for the halting of operations will be the shortage of materials and the better use to which the manpower and transportation can be put elsewhere during the period of the defense program.

The Navy's long-term program of Alaskan exploration, which so far has failed to develop any production of consequence, is merely to determine whether Naval Petroleum Reserve No. 4 contains any substantial producible oil which could be brought into use at some future time when the domestic supply situation warranted the heavy cost of lifting, transporting, and refining it.

Even if extensive potential resources were found, Alaskan oil could not enter the picture now or in the future, and the Navy has never claimed the reserve might be anything more than a hedge against a future need, and there is no intention of pressing the project if it takes tubular goods urgently needed for domestic oil production.

The Navy began its oil exploration in the Arctic Basin in the fall of 1944. Three shallow and 14 deep wells have been drilled. Two test holes gave encouraging shows of oil, but were not completed to the point of production. Several wells developed gas and South Barrow No. 2 is supplying the fuel requirements of the naval installations at Point Barrow.

Depletion Allowance

A new effort to eliminate or reduce the present 27 per cent depletion allowance for oil and gas producers will be made by the Treasury next month when the House ways and means committee begins consideration of tax legislation called for by President Truman in his budget message.

At the same time, consideration is expected to be given to revocation of the tax exemptions now provided for farm cooperatives, which have been the target of attack by conventional business over the past several years.

In his budget message, the President inferred that he wanted the full $16,500,000,000 required to balance the 1952 budget secured through taxation but Congress is not expected to go along with the idea of a 30 per cent increase in taxes, most of which would fall upon individuals. Instead, it is seen more likely to provide for an increase of two or three points in the rate of corporate taxation and increases of not exceeding 25 per cent in individual taxes this year, with another bill provided further increases next year if necessary.

The President shortly will submit more detailed recommendations for new legislation in which he will call for the closing of all loopholes for avoidance of taxes.

There will be considerable resistance to any tampering with the allowance, of course, particularly in view of the fact that high military officials have warned that the threat of war may hang over us for as long as 20 years which would make necessary the exertion of every effort to develop as much oil production as possible, but the Treasury has never conceded that the allowance is a needed incentive to exploration.

New Antitrust Policy

The Department of Justice has adopted a policy for the defense emergency of postponing antitrust cases only when it can be shown that prosecution will interfere with defense production, and will continue to press cases which will aid the mobilization effort by eliminating practices which hamper competition.

The department's position was disclosed last week by Assistant Atty. Gen. H. Graham Morison, new head of the antitrust division, at a Bar Association meeting attended by many of the leading antitrust lawyers of the country.

Morison gave notice that he will push ahead with pending cases and initiate new ones, despite the emergency, involving price fixing, limitation of production, withholding from the market, unauthorized market and customer allocation, tie-in sales, full-line forcing, and similar practices which, he said, are of fundamental importance to the defense effort.

Unlike the last emergency, when antitrust defendants sought postponement of suits through the defense agencies, all such requests now must be filed directly with the Department of Justice and will have to be accompanied by a definite showing that prosecution would be adverse to the interests of the rearmament program.

"We cannot allow shortages of materials to jeopardize our national security nor to become a bottleneck to our economic expansion. The task of the commission, therefore, will be to make an objective inquiry into all major aspects of the problem of assuring an adequate supply of production materials for our long-range needs and to make recommendations which will assist me in formulating a comprehensive policy on such materials."

Long-range outlook.—Specifically, the President said, the commission should study such questions relating to production materials as the long-range-requirements outlook, the long-range-supply outlook, the prospect and estimated extent of shortages, the consistency and adequacy of existing government policies, plans, and programs, and the consistency and adequacy of private industry practices.

In this analysis, he added, consideration should be given to the needs and resources of the nations with which the United States is cooperating closely on military security and economic matters, and in its final recommendations the commission should take into account "all possible methods of bringing supplies and requirements of essential materials into balance."

The President promised Paley his commission will receive the cooperation of all government agencies whose functions and interests relate to its assignment, but suggested that he solicit the cooperation of private industry.

DPA Head Named

William Harrison steps up to new post from NPA

WASHINGTON.—William H. Harrison stepped upstairs from the National Production Authority last week to become Defense Production Administrator, and his first official act redelegated back to the Petroleum Administration and other emergency agencies the powers originally granted them and of which they had been temporarily divested when the Defense Production Administration was set up by President Truman last month.

Pending selection of a permanent head for NPA, Manly Fleischmann, general counsel since the agency was established last September, who served in a similar capacity in the War Production Board, was named acting administrator.

At the Economic Stabilization Agency, Price Director Michael V. DiSalle split the commodity-pricing problem between seven divisions, one of which will handle transportation, public utilities, fuel, service, and imports and exports, and will be headed

by Richard L. Bowditch, Boston, who heads coal and shipping companies.

A committee on foreign supplies and requirements has been set up in the Office of Defense Mobilization. This will be an interdepartmental group on which Interior will have representation, to advise on problems relating to economic aspects of foreign requirements, including policies which should govern the allocation of materials and end items other than military to meet approved or proposed foreign programs.

General Price Freeze

It will have small effect on oil industry, ESA says

WASHINGTON.—Price-stabilization officials said this week that the general price "freeze" which went into effect January 26 will have little impact on the oil industry because the industry generally has been complying with the voluntary-stabilization program requested by the Economic Stabilization Agency December 18.

Even a rollback of prices to January 2 levels, which might be ordered when the ESA gets around to fixing dollars-and-cents ceilings for individual commodities, would have little effect, it was said.

The general ceiling-price regulation freezes prices at the highest levels charged between December 19, 1950, and January 25, 1951. With it came a temporary freeze on salaries and wages. Neither order satisfied anybody, the former because it failed to roll prices back from record-high levels and the latter because it froze earnings without also freezing food prices.

Exports affected. — The price freeze applies to exports and imports as well as domestic sales. Sales for export must be made at ceiling prices adjusted to take account of the seller's customary differentials for foreign trade. In the case of imports, if the commodity is resold in substantially the same form as imported and is delivered under a contract dated on or before January 26, the ceiling price may be adjusted to offset any increase in landed cost since the base period. Landed cost is defined as the foreign-invoice price plus expenses actually incurred for transportation, customs duties or import taxes, other commodity taxes, dock charges, clearance, insurance, letter of credit, and any customary buying commission to a purchasing agent outside the continental United States.

Won't interfere. — The regulation is designed not to interfere with customary pricing methods, providing that the ceiling prices shall reflect customary price differentials, including discounts, allowances, premiums and extras, based upon differences in classes or location of purchasers, or in terms and conditions of sale or delivery.

The tone of the "statement of considerations" leading to adoption of the order indicated that no general rollback of prices is now contemplated.

On the theory that the need of the moment was to "stop the onrushing price advance in its tracks," the choice of the December-January base period was dictated by considerations of administrative practicability, the ESA explained.

"The fact that prices are now frozen at current levels does not mean that there will be no downward adjustments in the future," the order stated. "In the future the price-cost structures in the various industries will be examined to determine where changes in present prices are appropriate.

"The unresolved question is whether and to what extent the purposes and provisions of the act require, at least for some commodities, a lower level of prices than the level established by this regulation."

Imports Attacked

I.P.A.A. counsel asks end of trade agreement

WASHINGTON. — The administration's reciprocal-trade-agreements policy has established "a dangerous trend toward dependency on foreign oil" and real injury to the domestic oil-producing industry, the House ways and means committee was told last week by Russell B. Brown, general counsel for the Independent Petroleum Association of America.

Testifying before the committee during hearings on extension of the Reciprocal Trade Act, which is due to expire next June 12, Brown said imports now are averaging 1,000,000 bbl. daily, or more than six times as much as in 1939, and while to those unfamiliar with the implications it may appear that we are fortunate in being able to obtain increased foreign supplies, close consideration of this trend indicates that we are dangerously following a tendency to increase our reliance on uncertain sources of foreign production, particularly with respect to residual oil, for which consumers along the Atlantic seaboard are dependent upon imports for over 40 per cent of their supplies.

Real injury.—"The greatly increased oil imports under the trade-agreement program have resulted in real injury to the domestic oil-producing industry," Brown said. "The United States has changed from a net exporter of 260,000 bbl. daily to a net importer of about 750,000 bbl. per day. This shift in foreign trade balance represents a loss of market for domestic oil of roughly 1,000,000 bbl. per day. A loss of market inevitably affects the extent of oil exploration and development effort in this country. This is true because the largest part of every dollar from the sale of crude oil is reinvested in the continuing search for new oil reserves and the drilling in these newly found areas."

Brown told the committee that in 1949, the capital from the sale of each barrel of oil in this country was used to find 1.77 bbl. of new reserves, but during that year domestic output was curtailed by 174,420,000 bbl. under 1948 which he estimated, on the 1.77-to-1 ratio, cost the country approximately 308,000,000 bbl. of new reserves.

Efforts discouraged.—Brown charged that efforts of the domestic producers to secure relief have been actively discouraged by the administration, in the face of repeated assertions by the State Department that the escape provisions would be utilized if injury should result to the domestic industry.

He pointed out that an application for investigation filed with the Tariff Commission in February 1949, was dismissed without hearing in May with the statement that there was a "current scaling down of both production and imports" which was not borne out by the facts, and a promise that the commission would observe further developments which never led to action.

Brown recommended that the act not be extended, pointing out that Secretary of State Acheson told the committee no new trade agreements are contemplated for at least 3 years, and charging that the program has failed to attain its objective of building strength and unity among nations. If the act is to be continued, it should be limited to 1 year and so amended as to include specific legislative standards and guides to provide proper safeguards in the negotiations of new agreements and assure necessary remedies under existing agreements, he said.

Board Makes Appointment

WASHINGTON.—Harry K. Clark, president of Carborundum Co., Niagara Falls, N. Y., has been appointed vice chairman of the reorganized Munitions Board, to be in charge of production management. Clark will be responsible for all production activities of the board, including those of the petroleum division.

During the last war, Clark was deputy director of priorities for the Office of Production Management and the War Production Board until he was called to active duty in July 1942, as chief of the emergency-plants division and the production-schedule and operation division in the office of the Secretary of the Navy, with the rank of captain.

Ace-in-the-Hole

California's Elk Hills Naval Reserve offers means for rapidly increasing daily output of crude if necessary

D. H. Stormont

LOS ANGELES.—With one notable exception, all California oil fields today are producing at near-capacity levels in order to meet increased West Coast needs and the higher military demand in the Pacific. Since this field, the Elk Hills Naval Reserve, is producing less than one-tenth of the volume of which it is capable, it affords the means for the state's daily output to be increased rapidly if needed.

Currently, Elk Hills' production is about 7,000 bbl. daily. With congressional approval it is estimated that it could immediately begin to produce from 82,000 to 120,000 bbl. daily.

Its present state of preparedness is in marked contrast to its condition at the outbreak of World War II. At that time output was about 12,000 bbl. daily. By June 1944 its output had been raised to 15,000 bbl. daily. Between then and March 1, 1945, when steel was short and drilling rigs scarce, as many as 19 strings of tools were used in boosting its production to 65,000 bbl. daily. Thus as a reserve to be used only in times of national emergencies, Elk Hills fell way short of what it could have produced had the reserves been readily available.

Reserves cited.—In an address before the San Joaquin section of American Institute of Metallurgical Engineers in January, Lt. Comdr. F. M. Tully, inspector at the Naval Petroleum Reserves, stated that Elk Hills reserves today totaled 650,000,000 bbl. He credited the shallow zone (sands above about 5,000 ft.) with a reserve of about 350,000,000 bbl. and the Stevens zone with about 300,000,000 bbl.

The MER of the shallow zone he set at around 65,000 bbl., estimating that it could produce at 50,000 bbl. for 5 years with a little additional drilling. He credited the Stevens zone as having an MER of 22,000 bbl. daily with a maximum of 65,000 bbl. per day.

The Stevens zone reserves are almost entirely a postwar development. At the time an extensive exploratory-drilling program was undertaken in July 1945, only nine wells had tested the 6,800-ft. pay. Of these only three were commercial producers. Between then and December 1948, when development of the zone was started, an additional 20 Stevens producers were completed.

Today there are 110 Stevens wells, and according to Commander Tully, 99 more will have to be drilled to complete the 80-acre zonal spacing. If drilled to a density of 40 acres, 281 more wells will be required; 675 more will be needed to drill down to 20-acre spacing, he said. At the present rate of development, using five rigs, he estimated it would take until the fall of 1952 to drill down to 80-acre spacing.

Shallow zone.—The shallow zone which today has 564 producible wells, received 317 new wells during the war. The exploratory program undertaken since 1945 succeeded in increasing this zone's proven acreage by 4,000 acres, containing an estimated new oil reserve of 57,000,000 bbl.

Only about 25 producers have been completed in this new shallow-zone area, leaving 200 locations yet to be drilled. Commander Tully stated the Navy recently decided to begin drilling these wells some time late this year. He anticipated that the addition of these 200-odd producers would raise the zone's production by about 18,000 bbl. daily.

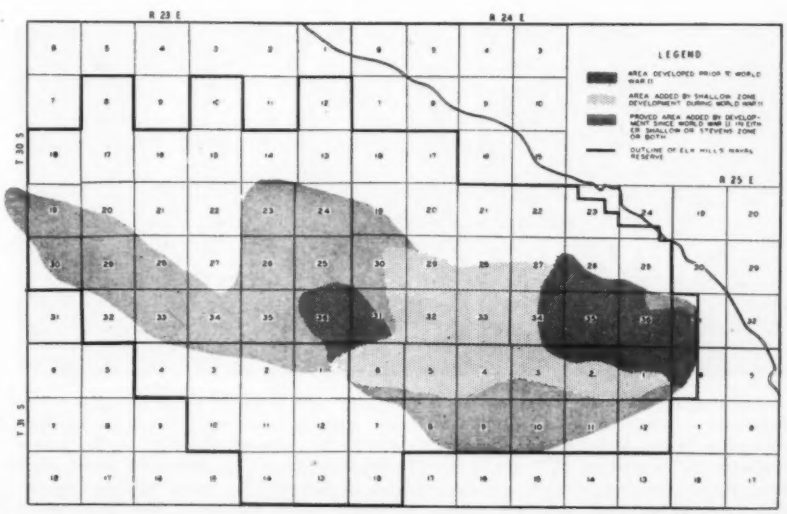
In addition to the current routine drilling, Standard Oil Co. of California (which has been unit operator since the field was unitized in June 1944) has a deep test under way in the southwest part of the field. Designated the No. X-55-30R, hole may be carried to 14,000 ft. to explore the lower Miocene and possibly the Oligocene and upper Eocene. Late reports showed the deep test to be drilling below 8,400 ft. Rocky Mountain Drilling Co. has the contract.

Data program.—When the field's output was reduced from 65,000 bbl. to 15,000 bbl. daily at the end of the war, it was deemed necessary to institute a program which would periodically furnish data on the mechanical condition and productive capacity of each well. This was accomplished by setting up a rotating production schedule under which all idle wells have been produced for a few days each year. This production, plus that of some 60 wet wells which have had to be produced more or less continually, has accounted for the bulk of the field's output in recent years.

The field's current output consists of about 5,100 bbl. daily from the shallow zone and 1,800 bbl. from the Stevens. As operator, Standard received one-ninth of the shallow production and about one-fifth of that from the Stevens. The Navy since last July has been shipping its portion to Japan to supply refineries there operating under Army supervision.

Gasoline Plant Planned

LOS ANGELES.—Plans for the construction of a new natural-gasoline plant and the addition of more gas-gathering facilities in Elk Hills field, Kern County, were made known here last week. According to Navy personnel connected with the Elk Hills Naval Petroleum Reserve, the plant will be of 50,000 M.c.f. daily capacity. Work on the plant and lines, which will be mainly vacuum, low-pressure, and gas-injection lines, will begin some time this summer.



Map showing extent of Elk Hills Naval Reserve, and areas of development.

L.P.G. Conversions

Growing movement toward adaptation of motor vehicles to propane and butane has begun to invade the oil industry

Roy F. Carlson

MIDLAND, Tex.—The growing movement toward conversion of motor vehicles to propane, butane, or liquefied petroleum gas power has begun to invade the oil industry. A number of West Texas oil-field trucking companies, for example, have converted or are in the process of conversion of their gasoline equipment, particularly where they are operating in an area where the liquefied gases are readily available.

The question of availability is the primary restriction on much more widespread use of these fuels. This arises because the fuels should be burned nearly all the time to pay for installation and equipment costs of converting the engine, and most vehicles will at some time or another reach an area where the fuels are not available. Although most engines can be equipped for dual-fuel—gasoline-L.P.G. operation—for just such an eventuality, this is not too satisfactory a solution.

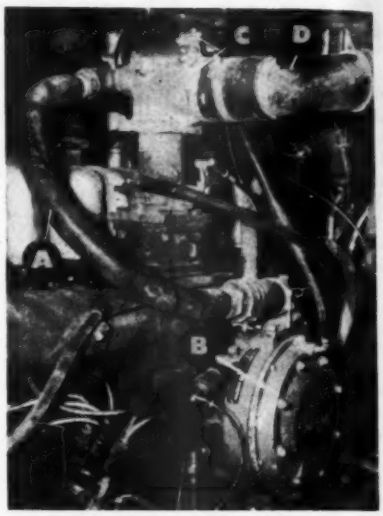
Because of the nature of the fuel, since it is given an octane rating of about 125, it should be used in engines of a higher compression ratio than gasoline engines in order to burn efficiently. And if the compression ratio is stepped up too much the gasoline operation, when necessary, will suffer.

Knockproof.—L.P.G. has the advantage over gasoline of being knockproof and will not vaporlock an engine. The gas is also dry, reducing the amount of crankcase dilution, and is furnished to the engine as a gas rather than a heavy vapor or liquid as in the case of gasoline, and thus gets even distribution between all cylinders in the multicylinder engine. The L.P.G. is considerably cheaper than gasoline—by roughly one-third when used as a road fuel. But it does lack somewhat from an over-all economy standpoint. It has a lower heating value than gasoline and is not utilized fully in existing engines so that mileage per gallon is somewhat less than for gasoline. It burns clean and completely in an engine, lessening the likelihood of early extensive repair, particularly since lubricating oil stays in good condition for a much longer time than with gasoline operation.

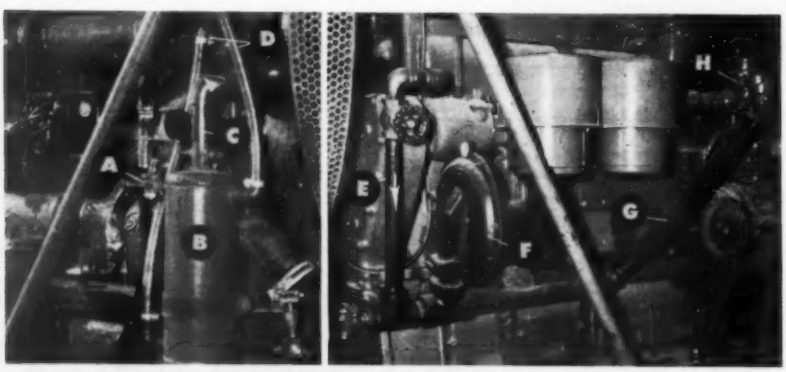
That repairs are less is shown by two identical trucks used by a West Texas trucking company. The first of these burned gasoline and underwent a complete overhaul after about 40,000 road miles. The second truck was converted to L.P.G. operation when new, and at the present time has been driven about 80,000 road miles, plus uncounted winch hours without the need of repair. And people are not guessing on how much farther the engine will go before it does need repair. After the first engine was overhauled, it too was converted to L.P.G. operation.

Conversion simple.—The conversion to butane or L.P.G. is rather simple. Equipment normally used includes a tank capable of withstanding bursting pressures on the order of 250 psi., a high-pressure regulator, a low-pressure regulator, a vaporizer, and a venturi throat either as part of or in place of the gasoline carburetor—depending on whether or not dual-fuel operation is planned. Some assorted valving and tubing is also required.

In operation the system takes liquid propane or L.P.G. from the tank through a filter to a high-pressure regulator that reduces the pressure from tank pressure to a low value on the order of 5 psig. This vaporizes most of the liquid, and any remaining liquid is converted to gas in a hot-water-heated vaporizer. The gas then goes to another regulator that controls the flow of gas into the engine. Generally the carburetion system works as follows: When the engine pulls air through the venturi throat, it reduces pressure in the throat below atmospheric. This reduced pressure is transmitted through the gas inlet tube to the low-pressure regulator, and the regulator opens to permit gas to enter the engine. When the engine slows, the pressure rises and the regulator reduces the amount of gas that enters the throat and the engine. At higher engine speeds the pressure is depressed more, and more gas is permitted to enter, furnishing increased fuel and power.



L.P.G. SYSTEM IN OIL-FIELD TRUCK.—Hook-up for converting a large gasoline-truck engine to L.P.G. operation. This engine will not burn gasoline with the carburetion system shown in the photographs. "A," L.P.G. line to carburetor; "B," vaporizer; "C," carburetor; "D," air intake.



L.P.G. DRILLING ENGINE.—Left photo shows vaporizer side of one of the large L.P.G.-fueled engines on a rotary rig in the West Texas fields. Heated, vaporized L.P. gas travels from this section to the other side of the engine through the pipe shown. "A," high-pressure regulator; "B," vaporizer; "C," gas to low-pressure regulator; "D," hot-water lines. Right photo shows the low-pressure regulator-carburetor side of the same drilling engine. "E," pipe-carrying L.P.G. from vaporizer; "F," low-pressure regulator; "G," gas line to "H" carburetor.

Expansion Program

Shell Oil completing new distribution facilities

A 4-YEAR program of expansion and improvement of distribution facilities throughout the United States will be completed by Shell Oil Co. early this year.

The program involving 49 new or enlarged plants in 25 states is the largest ever undertaken by the company and according to H. S. M. Burns, company president, comprises "two 5-year plans crammed into 4 years." Total storage and handling capacity has been increased by several hundred million gallons as a result.

A substantial part of the investment was devoted to expanding and improving the company's existing distribution plants. At both marine terminals and bulk depots new tankage has been erected, pumps and pipe replaced and equipment such as truck and railroad loading racks added or enlarged.

Among the larger units completed in the program are two at the Sewaren, N. J., plant. One of these receives, processes, and distributes alcohol made from petroleum. The other handles lubricating oil brought by tanker from the Gulf Coast.

Major facilities.—Locations where major facilities have been completed or are currently under construction include: Eureka, Redwood City, San Diego, and Colusa, Calif.; Tampa and Panama City, Fla.; Wood River and Argo, Ill.; Zionsville, Ind.; Bettendorf, Iowa; Louisville, Ky.; New Orleans, La.; Searsport, Me.; Baltimore, Md.; Fall River, Mass.; Grand Haven, Mich.; Winona Minn., Cape Girardeau, Mo.; Sewaren, N. J.; Rensselaer, Brooklyn, Mount Vernon, Plattsburgh, and Inwood, N. Y.; Wilmington, N. C.; Akron and Dayton, Ohio; Portland and North Bend, Ore.; Charleston, S. C.; Memphis and Nashville, Tenn.; Roanoke, Va.; Seattle and Tacoma, Wash., and Milwaukee, Wis.

A.P.I. to Study Sediments

NEW YORK.—A study of the role of marine sediments in creating crude oil will be conducted for the American Petroleum Institute's research committee by the University of California, in an effort to help solve the mystery of the formation of petroleum deposits.

Remains of prehistoric marine animal and plant life buried in sedimentary rock strata generally are believed to be the source of oil formations, but no detailed scientific evidence exists as to how this conversion occurs. An understanding of the formation of oil, the Institute says, would aid markedly in location and development of new deposits.

The new study will be part of the continuous fundamental-research program sponsored by A.P.I. for the petroleum industry. Work is expected to cover at least 3 years and will be in full swing by the middle of the year. Actual field work for the research project will be done by Scripps Institute of Oceanography, La Jolla, Calif., a branch of the University of California, under direction of Dr. F. P. Shepard.

Production Allowables Set

Louisiana's daily oil-production allowable for February has been set at a record 636,285 bbl., compared with the January figure of 629,751 bbl. S. L. Digby, conservation commissioner, announced in Baton Rouge last week.

The new figure compares with 577,660 bbl. in February of last year. Allowables by districts for next month are: Houma, 115,562 bbl.; Lafayette, 159,513 bbl.; Lake Charles, 77,010 bbl.; New Orleans, 162,897 bbl.; Monroe, 70,501 bbl.; and Shreveport, 50,802 bbl.

The Kansas Conservation Commission has retained that state's allowable for February at 300,000 bbl. daily, the same figure which has been in effect for the past several months.

CANADA

Gas Exports Banned

Premier claims Alberta reserves not sufficient

EDMONTON.—Premier E. C. Manning has announced that export of natural gas from Alberta cannot now be permitted, chiefly because estimated gas reserves are not sufficient to meet needs of the province.

The premier's declaration was based on a report from the Alberta Petroleum and Natural Gas Conservation Board, which placed reserves at 4,658 billion cubic feet. Requirements for the next 30 years were estimated by the board at 4,500 billion cubic feet.

Manning said the Alberta government is in complete agreement with the board's finding.

Could change.—However, although banning exports at present, the board said that it "believes that with the further development of established reserves and the development of promising strikes, the situation could change rapidly whereby export could be permitted. This, in the opinion of the board, would be in the best interests of the province and Canada."

Premier Manning was in definite support of eventual export of gas. He advanced three points in favor. Export of gas, he said, would: encourage oil and gas development by establishing a steady market whereby gas would become a valuable by-product of the oil industry instead of a headache; encourage industrial development through byproducts from gas fields; and enable more Alberta communities to use gas through a reduced cost made possible by a more complete network of gathering lines.

Oil men at Calgary, confident that exports would be permitted, were disconcerted by the decision. The board's estimate that reserves stood at less than 4½ trillion cubic feet was considerably below figures submitted at hearings last fall. These ranged upwards from 7 trillion cubic feet.

Rules Called Too Rigid

CALGARY, Alta.—Officials of Western Canada Petroleum Association have branded the Saskatchewan government's proposed new regulations of oil and gas exploration in the province as being to rigid. The regulations would retard exploration, they said.

The draft of new oil and gas rules was drawn up by Resources Minister J. H. Brockelbank to protect the interest of the province as well as oil operators. The draft was sent to W.C.P.A. and other interested parties for comment.

W.C.P.A. officials objected to regulations requiring the checkerboard pattern of obtaining leases, small size of leases (2-sq. mile maximum), and the quick release of all information obtained by drilling a well along with conclusions drawn.

They pointed out that Alberta rules allow leases of 3 sq. miles. If oil operators are to be attracted to the province, any laws should be even more lenient than Alberta's in view of the fact that little encouragement for exploration has been found, they said. If discoveries were made under more lenient rules, regulations could then be tightened, as was done in Alberta.

Big Price Paid for Lease

Canadian Gulf Oil Co. paid in $1,501,606 plus a 15 per cent royalty bonus to the Alberta Government last week to get a Crown reserve quarter-section near a Golden Spike field oil well. The big payment represented approximately 75 per cent of the total of $2,004,828 in cash bonuses received by the government following the recent offering of Crown reserve oil and gas leases and reservations.

The quarter-section purchased by Canadian Gulf, a subsidiary of Gulf Oil Corp., lies ½ mile north of and down flank from the Golden Spike well which found 600 ft. of D3 Devonian-reef pay zone. The company also bid in two quarters in the Ferintosh-Edberg area for $4,000 and $2,400.

The sale of Crown leases, first to be held in 1951, boosted to $60,350,113 the Alberta bonus take since the Crown reserve system was inaugu-

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rated in 1948. More than 58 per cent of the bonus total, $35,611,287.99, was taken in during 1950.

In addition, the treasury collects fees, rentals, and royalties on all Crown oil rights under lease or reservation. These amounted to at least $15,000,000 in 1950 and are expected to increase this year.

New Petrochemical Plant

MONTREAL.—A new Canadian petrochemical plant utilizing refinery gases for the synthesis of ethylene glycol and ethylene oxide, has been announced by Dominion Tar & Chemical Co., Ltd., here. The $5,000,000 plant will be constructed at Montreal East, a major oil refining center.

Contract for the new plant, the first of its kind to be built in Canada, has been let to E. B. Badger & Sons Co. through its associated Canadian company, Stone & Webster (Canada), Ltd. Construction is scheduled to begin in about 6 months and the plant will begin initial operation some time in 1952.

As raw charge, the plant will take mixed cracked refinery gas. Ethylene will be extracted and the ethane fraction will be cracked to supplement the original ethylene content. Initially, production will be limited to ethylene glycol for end use as antifreeze, and ethylene oxide which will be further processed by affiliated companies mainly for detergent manufacture. Another raw material, chlorine, will be obtained from the company's caustic plant at Beauharnois, Que.

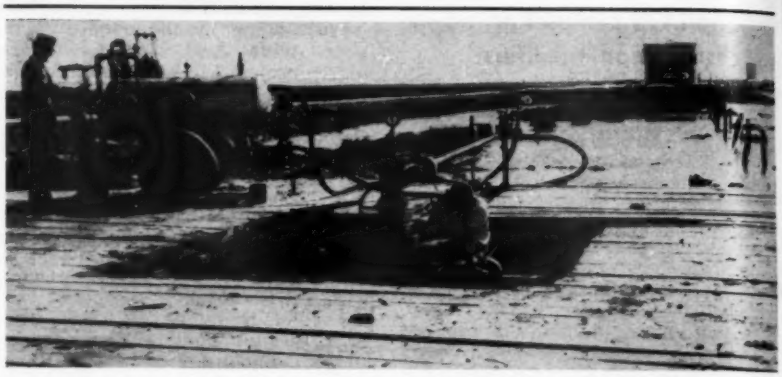
At Montreal East, Canada's largest refining center, are located four major oil refineries operated by British American Oil Co., Ltd., Imperial Oil, Ltd., McColl-Frontenac Oil Co., Ltd., and Shell Oil Co. of Canada, Ltd. Together they aggregate about 135,000 bbl. per day in crude-charging capacity, and fluid catalytic cracking units at each refinery total 50,350 bbl. per day in feed capacity. From this extensive local source of cracked refinery gas Dominion Tar & Chemical has to date contracted for the gas output of one refinery as yet unrevealed.

Tanker to Be Built

A sister ship to the world's two largest fresh-water tankers will be built for Imperial Oil, Ltd., to move Alberta crude from the Superior, Wis., terminus of the Interprovincial pipe line to ports serving Ontario refineries. The $4,000,000 ship will be built by Collingwood Shipyards, Ltd., and is scheduled for delivery in the spring of 1952.

The ship will have a length of 620 ft., a breadth of 68 ft., a speed of 13 knots, and will handle 115,000 bbl. on a 24-ft. draft. It will join the Imperial Leduc and the Imperial Redwater.

GULF COAST



FIELD REVIVAL.—A radioactivity log run in an old oil well southwest of Hitchcock in Galveston County, Texas, last week revived production in Green's Lake field after the area had been abandoned for the past 8 years. Shown above is M. L. Stone, field engineer for John W. Mecom, at left, checking initial flow tests on Mecom's 10 Joe D. Hughes, which was perforated from 6,440-45 ft. to draw a potential of 295 bbl. of 33°-gravity oil per day through a 10/64-in. choke. Gas-oil ratio was 1,083 cu. ft. per barrel.

Oil Field Revived

Green's Lake pool yields new pays after 8 years

Joseph A. Kornfeld

HOUSTON.—Green's Lake field in Galveston County, Texas, after a lapse of more than 8 years, has been revived after a radioactivity log run in an old well disclosed new oil and gas-distillate pays.

John W. Mecom, Houston, last week worked over 10 Joe D. Hughes on a 168-acre tract in Section 16, Sarah White Survey. On official state potential in the upper zone, the well drew a potential of 295 bbl. of 33°-gravity oil per day through a 10/64-in. choke with a gas-oil ratio of 1,083 cu. ft. per barrel. Production is through casing perforations from 6,440-45 ft., with 15 bullets.

No gage has been taken on the lower reservoir, a gas-distillate zone, which was perforated from 6,718-28 ft., with 30 shots.

Same operators plan to work over 9 Joe D. Hughes, an abandoned oil well, completed on July 5, 1940, for an initial potential of 354.57 bbl. of 31°-gravity oil from casing perforations at 6,550-62 ft.

The workover on 10 Hughes marks the fourth attempt of Mecom to find production at Green's Lake field. Since July 1950, he drilled three dry holes on the structure: 1 Houston Farms Development Co., total depth 7,930 ft.; 2 Houston Farms Development Co., total depth 7,800 ft.; and 1 Joe D. Hughes, total depth 7,150 ft.

Sun discovery.—Green's Lake, located 6 miles southwest of the town of Hitchcock, was discovered in 1935 by Sun Oil Co. by reflection-seismograph survey, following a preliminary torsion-balance survey by Humble Oil & Refining Co. in 1928. First commercial oil production was completed on June 4, 1936, by Sun's 1 Joe D. Hughes, which was initially perforated from 3,760-80 ft. However, the well was recompleted from 3,610-26 ft. on July 3, 1936, for a potential of 260 bbl. of oil per day on a ¼-in. choke.

The field was abandoned during May 1942 after it had produced only 133,330 bbl. of oil.

Clymore Properties Sold

CORPUS CHRISTI.—Sale of the oil-and-gas-producing properties of Clymore Petroleum Corp. in the Wyrick field of Refugio County, Texas, to Seneca Oil Co. of Oklahoma City was announced here by Garland Clymore, president of the Clymore firm. Consideration was $350,000 in cash, Clymore said.

The properties comprise approximately 700 acres of leases on which there are nine oil wells and two gas wells. Several of the oil wells are high gas-oil ratio producers and are now shut in. Currently, the properties average 190 bbl. of oil per day. Producing horizons include the upper Frio found at about 5,000 ft. The two gas wells, completed in a 2,800-ft. Miocene reservoir, are shut in for lack of a market.

J. F. McCown, Oklahoma City, is president of the Seneca organization.

Tidelands Decree Fought

WASHINGTON.—Louisiana, still fighting against federal control of tidelands oil, has filed a petition in the Supreme Court for a rehearing on the court's decree ordering enforcement of United States rights to the submerged oil lands.

Louisiana's petition called the decree, issued by the court last December, "sheer confiscation."

Jet-Fuel Problems

American refiners may learn much from British experience on what faces industry here as jet-plane output increases

George Weber

NEW YORK. — American refiners, facing the prospect of producing large quantities of fuel and lubricants for gas-turbine and jet aircraft, may learn much from British experience.

Ever since World War II the aircraft industry in Great Britain has been committed to the exclusive development of this type of plane for both military and commercial use.

As a result, the jet-fuel situation in that country has reached an advanced stage, and the requirements on British refiners may indicate what faces the industry here as the number of jet planes increases.

The fuels now used in England were described in some detail by Kenneth C. Hunt of Anglo-American Oil Co., Ltd., at a recent meeting of the New York section of the Society of Automotive Engineers, in which he described the development of the aircraft gas turbine in Great Britain and its influence on petroleum requirements.

Quality requirements.—While the gas turbine is basically capable of burning a wide variety of fuels, the limitations imposed by conditions under which aircraft, particularly military planes, must operate has given rise to new quality requirements. From the present British viewpoint, an acceptable fuel must have the following characteristics:

1. High specific gravity (or volumetric calorific value).
2. A vapor pressure of not more than 1-2 psi. (R.v.p.).
3. A freezing point below —76° F.
4. A flash point over 100° F.
5. An end point of below about 590° F., not from theoretical considerations but because there is at present no experience with higher end-point fuels.
6. A maximum sulfur content of 0.2 per cent with the expectation that this may be increased to 0.5 per cent.
7. A maximum aromatic content of 20 per cent with a probable increase as the result of experience to 25 per cent.
8. Some limit on sulfur and aromatic distribution.

Specifications.—These desired characteristics constitute a common goal of the closely cooperating aircraft and petroleum industries in Britain. They were determined by extensive experience gained from flying a number of turbojet and turboprop aircraft designs on five types of fuel, shown in Table 1.

The high specific consumption of the gas turbine, coupled with the restricted fuel capacity of the plane, makes a fuel of high heat content per gallon particularly desirable. A high-specific-gravity fuel is at a premium, said Hunt, the difference in aircraft range between the lightest and the heaviest fuels considered being 17 per cent.

Volatility.—Particular attention was paid to the volatility of fuel. "Reliance cannot be placed on the high volatility of a 5-7 psi. R.v.p. fuel to compensate for inherent deficiencies in the engine combustion system, because after some time at altitude, when stable fuel-tank conditions have been reached, what was originally a 5-7 psi. fuel will have deteriorated to a 1-2 psi. fuel. Such topping operations are much better done at the refinery," said Hunt.

Cooling or pressuring fuel tanks in jet aircraft to reduce losses due to high volatility are not practicable, due to severe weight and drag penalties, he stated. Ground precooling, not feasible on a world-wide basis, entails further operating difficulties including possible take-off delays.

The freezing point limit of —76° F. has proved a satisfactory level for aviation gasoline in world-wide operations and there is little evidence to indicate that a lower limit will be required for turbine fuel. In fact, commercial planes may be satisfied with a higher freezing point limit of —50° F.

Flash point.—For the immediate future an easement of the requirements set for a flash point of not less than 100° F. is likely to be permitted to provide the best compromise between usefulness in service and availability. The additional risks in handling and ground storage are considered a relatively small price to pay for maximum performance in the air.

It was the author's firm opinion, however, that the full requirements of the fuel characteristics listed above must be met in the longer-term future, and that the petroleum industry must do the necessary work to determine how best to satisfy them.

Lubricants. — The present range of British gas-turbine engines, both turbojets and turboprops, have been developed on three types of lubricant. All are petroleum oils, two of which are fortified with mild "oiliness agents." Their characteristics are shown in Table 2.

TABLE 2—JET LUBRICANTS

Characteristics—	Type F	Type G	Type H
Viscosity at 210° F., centistokes	3.15	9.0	9.0
Viscosity at —40° F., centistokes	7,000	...	...
Viscosity index	71	115	115
Pour point, °F.	—55	—20	—20
Flash point, °F.	310	420	420

Type F contains 0.1 per cent stearic acid and Type H contains 1.0 per cent sulfur-phosphorus mild extreme-pressure additive. These oils have provided satisfactory lubrication for gas-turbine engines up to their current stage of development and service use, Hunt reported. It is evident, however, that they will not be suitable for either turbojet or turboprop engines when they become fully developed and widely used, in his opinion.

For proper bearing lubrication in future gas-turbine engines, the requirements are as in Table 3.

TABLE 3—BEARING LUBRICANTS

Viscosity at 210° F.	not less than 7 c.s.
Viscosity at —75° F.	not more than 2,500 c.s.
Pour point	below —76° F.
Flash point	400° F. minimum

Gear lubricating properties equal to those of 100-seconds aviation oil.
Oxidation stability to be satisfactory.

Hunt reports that Esso European Laboratories has developed two synthetic lubricants in pilot-plant quantities, meeting these requirements. Commercial manufacture is now under way. Since consumption of lubricating oil by the gas-turbine engine has proved to be much lower than for piston engines, the lube-oil problem is not expected to be serious. As compared with an oil consumption by piston-engined aircraft, or 3 per cent of fuel volume, turbojet and turboprop oil consumption will range from negligible to about 2 pt. per engine per hour.

American viewpoint.—In a prepared discussion on the subject, Hugh Harvey of Shell Oil Co., New York, presented the American attitude on jet

TABLE 1—TYPES OF FUEL

Type—	Specific gravity	Flash point (°F.)	Freeze point (°F.)	End point (°F.)	R.v.p. psi.
Kerosine	.805	105	—49	554	negligible
Wide range	.77	—30	—85	590	5-7
Medium range	.78	12	—85	590	1-2
High-flash kerosine	.835	155	—49	500	negligible
Aviation gasoline	.715	—30	—85	320	5-7

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fuels. Since no commercial jet plane has yet progressed beyond the drawing-board stage in America, domestic concern for the present is entirely from a military approach.

The prime consideration so far as the military is concerned is the matter of availability in quantities needed in time of emergency, said Harvey. Potential commercial operators are further interested in cost and safety.

In this country, however, there is some feeling that the prime desirability of high heat content, cited by the British, may be overemphasized as far as commercial transports are concerned. The military emphasis on availability in this country has led to the present specification of a wide-range jet fuel with a high vapor pressure.

Volume problem.—This JP-3 specification represents about 50 per cent of the crude barrel. But the diversion of substantial quantities of this crude fraction to jet fuel would obviously detract seriously from the supply of fuels and feed stocks presently going to other forms of transportation.

Fortunately, said Harvey, although the military services are buying limited quantities of jet fuel to this specification, the petroleum and the aircraft-engine industries and the Government are carrying on continuous studies to determine what type of product will be suitable, in sufficient quantities, for turbojets in the light of all the essential requirements for petroleum products for automobiles, trucks, tanks, ships, diesel locomotives, and other required industrial civilian uses.

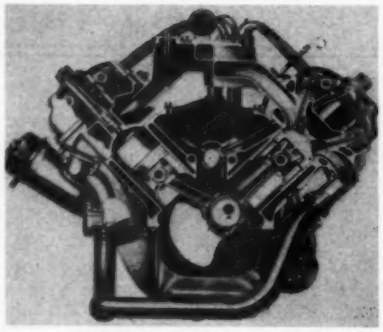
Short of an all-out military emergency, however, the problem of jet-fuel availability in this country will not present itself as soon as in Britain where turbo-fuel requirements have already increased rapidly and within a few years will be many times greater than those for aviation gasoline for use in piston engines.

New Jet Engine Tested

WASHINGTON. — The search for more economical jet-airplane engines is making progress, it was disclosed by the Navy last week.

The Navy announced successful completion of initial tests of the most powerful turbojet engine in the world, which has been in development since June 1947.

The new engine, which has 14,000 hp. at modern flight speeds, and is expected to develop almost twice as much power through the use of accessories, weighs less than 3,000 lb. and uses less fuel per pound of thrust than the best turbojet now in use.



Cutaway view of Chrysler Corp.'s new V-8 engine.

New-Type Engine

Chrysler claims better performance, more power

A NEW type of automobile engine which has a compression ratio of 7½ to 1 but will operate without knocking on regular-grade commercial gasoline has been placed on the market by Chrysler Corp.

The company will introduce the engine, a 180-b.hp. V-8, in its higher-priced 1951 model automobiles which go on sale February 10.

Theoretically, over-all efficiency of an automotive engine increases as the compression ratio becomes greater, and this in turn raises the octane requirements of the motor fuel. However, Chrysler engineers maintain that their V-8 will provide excellent service even when supplied with regular-grade gasolines.

Combustion chambers.—The superior combustion characteristics of the engine, according to the company, are the result of hemispherical combustion chambers—well known as the ideal shape for a combustion chamber, but which have been used before on aircraft and racing cars but not on high-production cars—and the location of the spark plugs.

Widely spaced valves make it possible to position the plug near the center of the compact, symmetrical chamber, which reduces the required flame travel through the fuel mixture following ignition.

Adaptable. — The hemispherical combustion chamber is adaptable to higher compression ratios, Chrysler reports, when and if higher-octane fuels become available. However, this development probably will be hindered for the duration of the national emergency. *(See page 29 of this issue.)*

Chrysler stated, in comparing its new engine with the firm's 1950 in-line 8-cylinder engine, that although 33 per cent greater power is provided by the new engine, a 10-per cent economy in fuel consumption has been effected, due to its efficient combustion chamber and low frictional-power losses.

MIDWEST

Water Flood Purchased

TULSA.—C. L. McMahon, Inc., has announced conclusion of purchase details and assumed physical operation of an active water-flood project in the North Johnson pool at Clark County, Illinois. The properties formerly were owned and developed by W. L. Pickens of Dallas.

Slightly in excess of 1,100 acres of leases situated in Townships 10n-14w and 9n-14w were included in the purchase, at an undisclosed bonus in both cash and oil. Transaction is retroactive to October 1, 1950.

Approximately 100 acres, or nearly a third, of the productive area is already developed and accepting water at the rate of 3,000 bbl. per day; oil production from the same developed area amounts to 225 bbl. daily. The productive formations are the Casey and Claypool sands occurring in the Pennsylvanian series at an average depth of 500 ft.

Clark County is situated in the center of the extreme eastern part of Illinois, and the North Johnson pool is located in the southwestern portion of the county and is its largest producing area.

This is C. L. McMahon, Inc.'s first venture in recent years into the field of water flooding, and it plans to expand the development of the North Johnson project rapidly during 1951.

ALASKA

Survey's Work Reviewed

Extension of the Geological Survey's work in the exploration for potential deposits of oil and minerals in Alaska is stressed in the annual report of the survey, which points out that only 49 per cent of the territory has been geologically mapped by reconnaissance methods so far and only a fraction of 1 per cent has been mapped in detail.

The need for intensification of this work, it was explained by Dr. William E. Wrather, director of the survey, lies in the fact that the discovery of new oil reserves and mineral deposits has become increasingly difficult because most of the deposits readily detectable already have been located.

Wrather pointed out that only 11,000 sq. miles of some 250,000 sq. miles of possible oil lands in Alaska has been mapped on an adequate scale.

The report disclosed that during the fiscal year ended last June 30, the survey's military geology branch cooperated with the Defense Department in an intensified program of study of the Alaskan permafrost, a major problem in oil and mineral development in the territory.

World Oil Control

Proposals for eventual internationalization of global oil supply scheduled to be presented at next ESC meeting

Bertram F. Linz

NEW proposals looking to eventual internationalization of the world's oil supply are definitely scheduled to be pressed at the next meeting of the Economic and Social Council of the United Nations which will open February 14 in Santiago, Chile.

Sponsor of the move is the International Cooperative Association, of which the International Petroleum Cooperative Association, with a membership of 21 cooperatives in 13 countries which had sales last year approximating $2,000,000, is an auxiliary.

Originally presented by the IPA at the 1947 meeting of the council, international control of world oil resources was rejected by an 8-to-2 vote in the committee to which it was referred, but that rejection was based on procedural grounds rather than the merits of the issue.

At that time, the IPA argued that the control of oil, particularly outside of the United States, was in the hands of a few large companies and was a monopoly and a source of international friction, and worked to the disadvantage of the cooperatives and consumers of petroleum, and the problem should be dealt with by taking over all reserves under some sort of international organization.

Received support.—When the proposal was first advanced in 1946 it received support in some State Department circles, and the matter was aired in a radio program August 16, 1946, which precipitated sharp controversy. In that program, John Loftus, then chief of the petroleum division; Charles B. Rayner, consultant to the department, and Col. Gus Vogel, executive officer of the Army-Navy Petroleum Board, appeared definitely to be plugging for U. N. control of oil.

It was brought out by Loftus that the proposed international oil body could discourage monopoly and open the way for small oil companies to enter the foreign field, make oil available to all nations on equal terms, and assure that countries with oil resources would get a fair share of the proceeds from development.

Additionally, Loftus said, the organization might review the terms of all oil concessions and contracts and suggest revisions, and serve as an arbitral tribunal where nations and oil companies that felt they were subjected to discrimination could seek a hearing and perhaps an adjustment.

Basis.—The basis of the whole idea was that the Anglo-American oil agreement, negotiated during the war and then before the Senate, which never ratified it, represented a start toward orderly production and distribution of oil throughout the world.

The rejection of the plan in 1947 was based on the ground that the question of oil could not be singled out for a separate study and that, if the rate materials problem had to be approached, it could be done only in an over-all way covering not only oil but coal, iron and steel, rubber, copper, and nitrates.

To meet that objection, it is reported that ICA next month will adopt a "back-door" approach, telling the council the oil situation is unchanged but it isn't quite sure what needs to be done and a study should be undertaken to see what action is necessary to insure a free flow of oil to consuming countries which have no indigenous petroleum resources and to protect the cooperatives and consumers. Inferentially, it is expected, the ICA will suggest expansion of the study to include other basic raw materials of world commerce.

Arguments outlined.—The arguments of the ICA were outlined in a memorandum filed with the council some months ago for study.

Emphasizing the "remarkably high degree of concentration of capital and enterprise" which it said is a characteristic feature of the oil industry, the association asserted that "it is evident that a concentration of capital of the magnitude that is shown by the larger and largest oil companies implies a virtual monopoly" which excludes effective competition on the part of smaller enterprises.

Since World War I, the ICA declared, "the rush for concessions has been principally propelled by the perception of the part oil is playing in modern warfare and of the importance of the control of rich and, from a military strategic point of view, conveniently situated oil fields for military preparedness. National interests have, to an ever-increasing extent, been married to commercial considerations, implying that in their pursuits in foreign concession areas the combines have frequently been backed up by their governments" which, in some cases, have been induced to acquire a stock interest in, or complete financial control of oil combines.

Danger cited.—"Another aspect of the problem of oil concessions—as of concessions in general—is the danger for direct conflicts between countries, caused by tensions between concessionaires and concessions-granting governments," the memorandum continued. "It has been pointed out that when natural resources of any kind are developed by foreign capital in the midst of a poor people it may easily appear to be greedy exploitation, or even robbery of the natural wealth of their country for the further enrichment of richer peoples. The wish of governments to protect the investments of their nationals may lead to situations of undue political pressure, to humiliating situations for the country granting concessions, and to actual disputes. The need for an international authority to adjudicate conflicts and disputes bound to arise from oil concessions, not only from the point of view of international law but at the same time in view of the interests of the maintenance of peace and of world economic progress, stands out clearly in the light of happenings in the past."

Needs.—"What is needed, and particularly in the field of oil concessions," the memorandum said, "is the general acceptance of some guiding principles for the drawing up and application of concessions contracts so as to prevent the concessions from developing into pillars for autocratic international monopolies detrimental to free international trade and to the legitimate consumer interests, and the concessionaires from assuming supergovernmental powers dangerous to world peace."

Specifically, the ICA called for an international oil convention to be carried out by a U. N. organization:

"1. To see that oil concessionaires operate in the public interest.

"2. To plan and enforce oil conservation measures.

"3. To provide equal access to oil stocks in order to assure that all nations, large and small, can buy oil on an equal footing.

"4. To assure that all types of purchasers—governments, cooperative organizations, or private corporations—can buy oil on a basis of equality.

"5. To prohibit price discrimination in favor of particular purchasers and to assure that all purchasers can buy oil in adequate quantities.

"6. To serve as a tribunal to adjudicate any oil disputes that might arise (complaints might be brought by member governments, oil-field franchise or leaseholders, or purchasers. At present no tribunal exists to which such disputes may be brought for settlement)."

Warning issued.—"If a solution is not found to these problems," the ICA

warned, "there is every danger that the development of the last decades will continue, causing still more serious dislocations in the general supply of petroleum and its products and growing obstructions to an increase in the world oil production, which will keep pace with the expanding demand. The oil companies will strive to tighten their grip on the world's actual production and potential reserves to reinforce the foundations of their monopoly; more and more countries in geographical possession of these reserves will nationalize their resources, thereby exposing themselves to the temptation to utilize them—in the monopolistic ways indicated by the big commercial oil combines—to the benefit of their national exchequers; and more and more importing companies will contemplate the establishment of national import monopolies to try to evade, in some way or other, the exorbitant private taxation imposed by the international combines."

New form.—In its new form, the proposal may be difficult to oppose from one angle and may find little support from another. The United States delegation is expected to object to any action dealing with international resources, although no hint has been given of the position it will take.

It may be difficult to oppose anything apparently so innocuous as a mere study of the world oil situation, and from that angle the idea will get support from countries which have no oil of their own.

But many of those same countries have resources of other basic materials which might be included in the expanded proposal, and will oppose anything which might result in their being thrown into the basket for U. N. control.

At the same time, Russia is a member of the council and may be counted upon to oppose vigorously anything that would open its internal operations to inspection or study. And since Russia and its satellites control a big part of the world, any study of world conditions in which it did not participate would, in fact, be no study at all.

Finally, the council in recent meetings has taken the position it should clean up the work to which it was already committed and take on no new projects of less than urgent emergency.

LATIN AMERICA

Pemex' Program

Mexican Government oil agency plans 50 per cent more wells, production increase, new refineries during 1951

Dahl M. Duff

AN ambitious program calling for a 50 per cent increase in wells drilled, further sharp gains in crude production, and the construction of several refinery projects has been outlined for 1951 by Petroleos Mexicanos.

The official program of the Mexican Government oil organization for the coming year as announced by Sen. Antonio J. Bermudez, director-general provides for the drilling of a minimum of 300 wells, using 105 rigs. The plans are for keeping 44 exploration crews working in proved and wildcat areas.

By comparison, during 1950 up to December 20, 196 wells had been drilled in Mexico, and on that date, 57 rigs were in operation. The drilling in 1950 was largely on proved acreage. Of the total, 111 were productive, and the remaining 85 dry or noncommercial.

Of the 196 wells, 5 were completed by foreign operators working in Mexico under percentage-of-production contracts. Of these, one produced oil, and the other four were gas wells. Four wells were being drilled by foreign contractors on December 20.

By districts, the drilling last year was as follows:

District—	Completed	Producers	Noncommercial	Drilling
Tampico and Northern	40	15	25	9
Southern	84	38	46	12
Escolin and Poza Rica	27	28	(gas) 1	10
Northeast	18	14	4	11
Isthmus	27	18	9	15
Total	196	111	85	57

Production.—In the producing department, Pemex believes it will show an increase of about 80,000 bbl. daily during 1951. During 1950, Pemex raised crude output by about 36,000 bbl. daily to a year's average estimated at about 201,000 bbl. daily.

The greatest increase in Mexican production came during the last quarter of the year. From 205,000 bbl. daily in September, output was brought to 228,000 bbl. daily in December, according to Bermudez. Besides the oil, a total of 400,000,000 cu. ft. daily of gas was produced during the last month of the year.

While the increase shown last year in Mexican production was substantial, it fell considerably short of some of the more optimistic predictions that had been made earlier. Pemex is under considerable pressure to increase production as rapidly as possible. To obtain exchange to finance necessary imports of equipment and some specialty products, it needs to continue a relatively high level of exports of crude.

At the same time, it must satisfy a sharply rising domestic demand for products. Mexican consumption increased on the average 10 per cent annually in the 10 years prior to 1950 when it jumped an estimated 25 per cent. Record sales of automobiles, trucks, and other vehicles, the Mexican industrialization program, and Pemex' own campaign to swing cooking and heating from charcoal over kerosine, all point to further increases in petroleum demand this year.

Refining.—In the refining field, Pemex's official program for 1951 includes the following: A new refinery at Salina Cruz or some other Pacific Coast site; a lubricating-oil and paraffin plant at the Salamanca refinery; desulfurization units at the 18 de Marzo and the Cuidad Madero refineries; and expansion of the newly completed refinery at Reynosa. The projected West Coast refinery is one long planned by Pemex. It would meet domestic requirements in Sonora, Sinaloa, Chihuahua, and Baja California, eliminating dollar imports in these regions.

Last year saw the construction of two new refineries by Pemex—at Salamanca and Reynosa—and the modernization of some of the older plants. The 30,000-bbl. daily Salamanca refinery, built by Arthur G. McKee, was inaugurated in July. The smaller Reynosa refinery, Pemex-built, went on stream recently. Last year, Pemex also expanded and improved the Mata Redonda refinery near Tampico, increasing its capacity from 6,000 to 17,000 bbl. daily.

Pipe lines.—Pemex' 1951 program provides for the completion of several pipe-line projects now under way. These include the oil line across the Isthmus and gas lines from Brazil field to Poza Rica via Tampico, from Reynosa to Monterrey, and from Monterrey to Cementos Hidalgo. Natural-gas-distribution lines are planned in Matamoros and other border cities. These gas lines and the retail distribution systems in northern Mexico will make natural gas a revenue item for the first time in the history of the country.

Mexican oil officials have been concerned recently over the possibility that the defense effort in the United States and Western Europe will shut off or restrict the necessary flow of equipment to carry out its drilling and other oil-industry plans. However, the belief in Mexico City is that development of Mexico's industry will be looked on as essential to the defense program.

Pipe supply.—Barter agreements for pipe from Europe have relieved

XUM

Christendom was saved by steel

ALL day long, waves of Arab horsemen beat upon the ranks of Charles Martel's veteran militia. But time after time, the enemy cavalry recoiled before storms of iron-tipped javelins, their shining scimitars unsuccessful. On the second morning, the Saracen leader, Abderrahman, was slain, pierced with many spears. The Moslem horde fled back across the Pyrenees, never again to menace the Western world.

Time after time, as at Tours in 732 A.D., Christian civilization has been threatened by seemingly invincible enemies. Yet history proves that victory invariably has gone to the nation or alliance which excelled in the production and use of iron and steel.

In the present era of alarms and crises, it is reassuring to realize that America has greater capacity for making steel than all the rest of the world combined. Furthermore, the American steel industry is expanding at a rate far faster than that of all the dictator-directed economies behind the Iron Curtain. Our free and independent steel making and metal working industries can and will forge sinews for the peace we want or for the war we may be forced to fight.

So remember this: It is not only the threat of Muscovy to fear—America has itself to fear also—its misguided sentimentalists, its sheltered saboteurs—who seem to play communism's game by frittering away our strength and our resources.

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XUM

Mexico's dependence on the United States only slightly. Last year, French manufacturers working through government sources sold Pemex 12,000 tons of 6-in., and small amounts were received from Germany and Belgium.

In Mexico City, Kaiser Steel Corp. is given credit as an outstanding factor in allowing Pemex to undertake a number of pipe-line projects last year. This company was said to be the first to open the door to Pemex with open-account credit when they started delivery early in the year of 60 miles of pipe costing $2,000,000. Kaiser has since taken another $3,600,000 order for 1,115,000 ft. of 16-in.

The percentage-of-production contracts which Pemex is offering foreign operators continue to attract the interest of various small United States companies, and there are recurrent rumors of new agreements of this nature about to be signed. Pemex has repeated it is willing to close such contracts with any reliable company accepting its terms of 15 per cent of production for 25 years plus additional 50 per cent until costs of the operation are repaid.

Major United States companies, however, take the position they cannot enter into such an agreement since it in effect places them in the status of a drilling contractor and out of the oil business as such. On the other hand, under Mexican law, Pemex cannot offer the standard-type royalty contract.

Contracts.—Last year, three of these percentage-of-production contracts were signed. The companies involved were Sharples Oil Co., Denver, known in Mexico as Sharmex; Isthmus Oil Co., Amarillo; and the Edwin W. Pauley organization of Los Angeles. Although contract negotiations fell off during the course of last year, some of the discussions may still bear fruit, among them those with Southeastern Oil Co., Jacksonville, Fla., headed by Gordon Duke, and with Cie. Francaise des Petroles, 35 per cent owned by the French Government. It has been reported in Mexico City that an unnamed major company is considering an over-all development contract for large areas of northern Mexico around Reynosa in Tamaulipas.

Besides the three percentage-of-production contracts, Pemex last year signed a number of service-company contracts and is in negotiation in regard to several others. Last year's agreements include those with Halliburton Oil Well Cementing Co., Rotary Engineering Co., Midland, Tex., Independent Exploration Co., Houston, and Combustion Engineering-Superheater, Inc., New York. Pemex recently announced in New York that, in view of the present volume of its operations, it had decided to deal directly with equipment manufacturers and producers "without any intermediaries." The agency requested its customers and suppliers to communicate directly with its New York office or with the general headquarters in Mexico City.

Exploration in Pakistan

This scene reflects the continuing efforts of Burmah Oil Co., Ltd., organization to discover additional reserves in western Pakistan. Bugti tribesmen are shown at work on the approach road to the wildcat to be drilled by Pakistan Petroleum, Ltd., at Sui in Baluchistan. The location is southeast of Quetta and southwest of the present Punjab producing fields. Pakistan Petroleum is the local company organized last fall by Burmah Oil to carry out its program in Pakistan.

Oil Bill Signed

Bolivia relaxes ban on mixed-company operations

A BILL relaxing restrictions against foreign oil capital in Bolivia and allowing mixed-company operations in designated wildcat areas has been signed by the Bolivian president.

The measure lifts petroleum fiscal reservations in the zones of Iturralde and Caupolican in the Department of La Paz, the departments of Beni and Pando, and the provinces of Ayopaya and Chapare in the Department of Cochabamba. All these areas are considerably distant from the present producing areas in the southern part of the country.

Yacimientos Petroliferos Fiscales Bolivianos, the state oil agency, is authorized to contract with mixed-companies—joint enterprises of government and private capital—for exploration and development in the specified areas, subject to legislative approval in each case. The Senate and Chamber of Deputies of the Bolivian Congress approved the new bill earlier in a bid to attract private foreign capital into the country. Bolivia has been closed to private oil development since the Standard Oil Co. (N. J.) properties were taken over in 1937.

New oil law.—The new oil law is the outgrowth in part of shortages of petroleum products which occurred in Bolivia last fall and resulted in public criticism of Y.P.F.B. There was discussion of a completely new petroleum policy for the republic, and a bill was introduced in the congress to create a High Petroleum Commission which would make a thorough study of the industry.

The difficulties largely arise out of the relatively low level of crude-oil production, recently 1,200 to 1,500 bbl. daily and principally from Camiri field. To raise production, Y.P.F.B. recently decided to complete its Los Monos discovery well despite high gas pressures. This well is estimated to make 500 bbl. daily, but a pipeline connection is needed to run the crude.

Production.—Current production is insufficient for continuous operation of new Cochabamba refinery *(The Oil and Gas Journal, November 9, 1950, page 69)*. This 5,000-bbl. daily plant, financed partially by the Export-Import Bank, made one successful test run charging 42,000 bbl. over a 17-day period. At the time, it was reported that another 2 months would be required before enough crude would be accumulated to refill the pipe line from Camiri and permit another run. In December, Y.P.F.B. was again forced to import an estimated 20 per cent of the country's gasoline requirements.

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NOMADS VISITORS.—Above are foreign visitors who attended the recent meeting of the Houston Chapter of Nomads. Left to right: W. O. Calvert, manufacturing representative, London; John W. Gunn, Texas Petroleum Co., Colombia; Doc Skinner, Homco Service, Inc.; F. F. Roberts, Reed Roller Bit Co., Caracas, Venezuela; J. M. de la Garza, Petroleos Mexicanos, Mexico City; and J. Ralph Coleman, Mexican American Independent Co., Mexico City.

Second Well Completed

Sinclair Oil & Refining Co. has successfully completed a second well in its Guere discovery area in the state of Anzoategui in Eastern Venezuela.

Guere 2, located about ⅜ mile northwest of the discovery well brought in last October, produced at the rate of 456 bbl. daily of 33.6°-gravity oil through a ⅜-in. choke. Production was from 7,846-66 ft.

Three other potentially productive sands were encountered in the well, none of which has been tested. When first tested, the discovery well produced about 500 bbl. daily, and later 1,276 bbl. daily, through ⅜-in. choke from 7,885 ft. The wells are on a 15,500-acre concession. Sinclair Oil & Refining is the operating subsidiary of Venezuelan Petroleum Co., which is controlled by Sinclair Oil Corp.

Mexican Pipe Line

Coast-to-coast carrier to be completed this spring

COMPLETION of the first coast-to-coast pipe line in the Western Hemisphere, from Minatitlan to Salina Cruz, Mexico, is set for May of this year, it was announced last week by Antonio J. Bermudez, director general of Petroleos Mexicanos, through his Washington information office.

The 10-in. 155-mile line will transport gasoline, kerosine and diesel oil from the East Coast refinery to the West Coast port at an initial rate of 15,000 bbl. daily, Bermudez said. Later, a refinery will be built on the West Coast and the line converted to transportation of crude at the rate of 30,000 bbl. daily through the addition of a pumping station at a midway point.

Bermudez said the pipe line will result in savings of well over $1,000,000 a year to Pemex and will release some 200 tank cars for other service. He explained that the route of the line, generally that of the Isthmus Railway, was selected over two others, one of which would have required the building of 62 miles of road through land subject to high flood levels and the other would have held up construction until completion of a projected highway.

Compromise.—There were also three alternatives considered in determining the size and most advantageous use of the line, one to transport crude in substantial volume mainly to meet export needs, a second to transport a lesser amount of crude to supply domestic consumption, and the third to transport products for domestic supply. The 10-in. line was selected as a compromise which would permit the movement first of products and later of crude, Bermudez said.

For the movement of products, only one pump station will be used, at Minatitlan, which will have two reciprocating 15,000 bbl. per day Wilson-Snyder duplex pumps operated by 2 Type J-T-6, 255-315 hp. 270-330 r.p.m. Cooper-Bessemer diesel engines. Only one unit will be operated, to handle up to 15,000 bbl. daily of products at pressures varying from 600 to 800 psi., with the other unit used as a spare.

Midway station. — A similar station will be built approximately midway between terminals when the line is switched to crude. The same type of equipment will be used because of the absence of electric power at the site of the station.

Terminal facilities at Salina Cruz will include 430,000 bbl. of tankage capacity. Present consumption of light products on the Mexican Pacific Coast includes 4,300 bbl. daily of gasoline, 1,500 of kerosine, and 3,300 of gas oil, but by 1955 the demand is expected to be up to 6,000 bbl. daily of gasoline and 4,500 bbl. each of kerosine and gas oil.

The pipe line is being constructed by a private contractor, Compania Constructora El Aguila, S. A., which participated in the construction of the recently completed 280-mile, 12-in. line from the Poza Rica fields to the new Pemex refinery at Salamanca. The project will cost $3,427,600.

FAR EAST

Burmese Work to Resume

A limited resumption of work in the oil industry in Burma is indicated in recent reports from Rangoon.

The dominant company, Burmah Oil Co., Ltd., and the Burmese Government have been in negotiations, and it was reported that plans for future operations cooperatively with the government are expected to be announced in the near future.

B.O.C. announced plans to ship some additional refining equipment to Chauk field, and the company was preparing to undertake new drilling to maintain production in the field.

The Burmese oil industry, prewar one of the most important in the Far East, was devastated during the war. B.O.C. and the two other British companies owning the properties attempted to rehabilitate the industry but, because of civil turmoil in the country, they abandoned their efforts early in 1949. The Burmese Government failed in an effort to raise funds to buy a share of the industry, and the British Government withdrew its financial support from the rehabilitation program.

The field topping plant at Chauk with a capacity of about 1,800 bbl. daily, has been meeting about 40 per cent of the country's controlled requirements for products. Prewar Burma had a refining capacity of 27,000 bbl. daily, but it was left in shambles in 1945. The companies originally planned a joint new refinery at Syriam, near Rangoon, but the project was shelved because it was not possible to reconstruct the pipe

line connecting Rangoon with the fields in Central Burma.

Siam Storage Plant Opened

Standard Vacuum Oil Co. has opened a new bulk-storage plant and hydrant-type aircraft refueling system at the Don Muang airport at Bangkok, Siam. Fuel is pumped through a 6-in. pipe line from storage to any of 13 hose outlets on the airport aprons. Tankage adjacent to the airport has a capacity of more than 75,000 gal.

EUROPE

World Oil Congress

200 papers already in for third annual meeting

MORE than 200 technical papers covering all phases of the petroleum industry have been received and another 100 promised for presentation at the Third World Petroleum Congress to be held May 28-June 6 at The Hague. There is every prospect that the 1951 meeting of the international petroleum group in the Ridderzaal (Hall of the Knights) will be a major success, according to members of the organizing committee of the congress.

In addition to 10 sectional meetings, the organizing committee has scheduled four general lectures featuring addresses by internationally known oil men, the first of whom, Prof. G. C. Hugel, Institut Francais du Petrole, will speak May 29. His address will be concerned with recent progress made in the chemistry of petroleum and its derivatives.

Other speakers at the general lectures with their topics are: Dr. C. M. Lees, Anglo-Iranian Petroleum Co., Ltd., "The Oil Fields of the Middle East;" Prof. J. J. Broeze, Royal Dutch-Shell Laboratory, Delft, "Future Aspects of the Applications of Fuels and Lubricants;" and Dr. E. V. Murphree, president of Standard Oil Development Co., "Benefits From Research to the Petroleum Industry."

Sectional meetings. — Sectional meetings have been scheduled on geology and geophysics; drilling and production; physical operations in oil processing; oil processes involving chemical conversions; production of chemicals from petroleum, their properties and applications; measurement and control, analysis and testing, composition of petroleum; utilization of oil products; construction of equipment, materials, corrosion; transport, storage, and distribution; and economics and statistics, documentation, education and training.

Technical excursions to various important Netherlands industrial undertakings are arranged for days when no meetings are scheduled during the congress. Included are trips to Schoonebeek oil field, refineries of Royal Dutch-Shell Group and California Texas Oil Co., Ltd., and the Royal Dutch-Shell Group laboratories at Delft and Amsterdam.

History.—The first congress was held in London in 1933 and the second in Paris in 1937. Organization work for the third congress has been handled by the petroleum-engineering section of the Royal Netherlands Institute of Engineers through a central organizing committee and national committees in each participating country.

The initiative for the coming congress was taken by the permanent council of the World Petroleum Congress. This is composed of representatives of seven major oil countries. G. A. Tuyl Schuitemaker was recently elected chairman of the permanent council which was headed by Col. Louis Pineau until his death in Paris last September. Schuitemaker is president of the petroleum section of the Netherlands Institute of Engineers and an adviser to the Royal Dutch-Shell Group.

Discussions.—In order to allow as much time as possible for discussion and questions, none of the papers will be read at the sectional meetings. A summary will be presented by a discussion leader in which principles of the subject or possible controversial points will be brought out to form the basis for subsequent discussion. Preprints of the papers are to be circulated about the beginning of March to those planning to attend.

The national committees which have represented the organization of the congress include leading figures of the industry in practically all the important oil-producing and consuming countries of the world except those under Communist control. Among them are numerous government officials dealing with oil.

ECA Approves Facilities

A $4,630,000 investment guaranty was approved last week by the Economic Cooperation Administration in connection with a project for investment of nearly $20,000,000 in a 97-mile, 8-in. crude-oil pipe line from Savona, Italy, to Milan and construction of a refinery with a capacity of 13,350 bbl. daily near the latter city by the Societa per Azioni Raffineria Padana Olii Minerali.

The company has been organized by Caltex Oil Products Co. and Fiat-Societa per Azioni. Caltex expects to provide $4,000,000 in capital and advances and on the basis of that dollar investment ECA will guarantee the convertibility of lire into dollars to a maximum of $4,630,000. The additional funds necessary for the project will be provided by Caltex and Fiat from nondollar sources.

An ECA announcement said that when the Sarpom refinery is in full operation it is expected to make a net dollar exchange saving to Italy of more than $2,000,000 a year as a result of importation of crude oil, rather than refined products, and possible exports of refined products to Switzerland and Austria may earn foreign exchange for Italy equivalent to more than $1,000,000 a year.

The refinery will be strategically located in the center of the oil-consuming area of Italy north of the Apennine Mountains and through Caltex and its associated companies will have access to an assured supply of crude from Middle East sources at competitive world prices.

Refinery Agreement Signed

Omnipetrol, G.m.b.h., German subsidiary of the French company, Omnium Francais des Petroles, has concluded a refinery processing agreement with Ruhrchemie, A.G., of Oberhausen-Holten.

The French organization will furnish Middle East crude to Ruhrchemie for refining in Germany on a fee basis. Omnium will retain possession of the crude and the finished products. The crude will be topped in the existing distillation unit, and the residue subject to thermal cracking.

Maximum throughput is planned at about 4,000 bbl. daily and about 2,000 bbl. daily of the production will be gasoline. With the consent of Allied authorities, Ruhrchemie is to repair its damaged equipment and erect new facilities. Omnium Francais has large interest in several oil companies operating in Europe, North Africa, and the Near East.

Motor-Fuel Price Boosted

Rising tanker rates caused an increase in the price of motor fuel in the United Kingdom last week.

Oil companies raised prices for the single grade sold by ½ d. to 3 s. 1½ d. retail in the so-called inner zone within 15 miles of the main importing centers, including London. Aviation-gasoline and motor-oil prices also were increased.

The new price for motor gasoline is the equivalent of about 36 cents per United States gallon. Of this, slightly more than 17 cents consists of the British Government tax. In the other zones farther from the ports, prices are fractionally higher.

In London, Anglo-American Oil Co., Ltd., said the increases were due to higher charges for ocean freight which had been approved by the government. Tanker rates world-wide have been skyrocketing since last summer, increasing three and four times above the earlier levels.

PERSONALS

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World Traveler

Aramco head has covered 354,000 miles in 3 years

WILLIAM F. MOORE, Arabian American Oil Co. president, was apparently destined for a life of travel, having flown a total of 354,000 miles, or the equivalent of more than 16 round-the-world trips, during the last 3 years.

Born in Richwood, Ga., June 12, 1899, Moore left high school in 1917 to become a seaman in the Navy. He made 13 Atlantic convoy-duty crossings, and during his off time studied operating engineering. After his discharge as a chief gunner's mate, he joined The Texas Co. in 1920 as a helper in the Port Arthur, Tex., refinery.

Continuing his self-education, he moved rapidly on to other jobs with the company. After various assignments in the United States, he went into foreign operations, and between 1943 and 1947, under wartime conditions, he flew throughout Central and South America and between various offices and plants in Europe. After serving 2 years as general manager of the company's foreign-operations department, Moore was elected president of Aramco in 1947. In this capacity he makes frequent trips between Saudi Arabia, New York, and San Francisco.

Moore directed the 2-year discussions and negotiations which culminated in the Jeddah Agreement of December 30, 1950 *(The Oil and Gas Journal, January 11, 1951, page 60)*. He was familiar with changing conditions and new trends in the company's zone of operation and communicated these developments to the Aramco directors. With them, he worked out and put into application the formula which was finally adopted.

"We feel that the new arrangement is in the best interests of the American and Saudi Arab governments and people, and of Aramco," Moore commented recently. "We now will be able to operate in a more settled atmosphere and concentrate on producing oil for any part of the world where it is needed. And we are glad to have a part in the expanding economy of the Middle East."

Lawrence D. Christian, associate petroleum engineer for Humble Oil & Refining Co., has been transferred from Houston to Conroe, Tex., as reservoir engineer.

William L. Carr, geologist for Pure Oil Co., has been transferred from Clare, Mich., to Chicago in the same capacity.

Dr. M. E. Spaght, president of Shell Development Co., has been elected to the board of Shell Chemical Corp. Holder of degrees in chemistry from Stanford University, and a former student at University of Leipzig, he has been with Shell since 1933.

T. CREIGH, JR.

Thomas Creigh, Jr., chief engineer for Kansas-Nebraska Natural Gas Co., has been named vice president in charge of engineering and gas supplies with headquarters at Hastings, Neb. In 1936 he left Northern Natural Gas Co. and joined Kansas-Nebraska at the time the company started its pipeline system. In 1939 he was appointed to the board of directors and made assistant to the president, serving in that capacity until he was made chief engineer in 1943. **W. P. Waller,** division manager at McCook, Neb., will move to the company's headquarters at Hastings as general superintendent of distribution. **L. J. Stelling,** district manager at Central City, was appointed division manager of the firm's operations in southwestern Nebraska and northwestern Kansas, with headquarters at McCook.

A. C. Long, vice president in charge of foreign operations in the Eastern Hemisphere for The Texas Co., was elected an executive vice president of the firm. He will be responsible for all foreign operations in both the Eastern and Western Hemispheres with headquarters continuing in New York.

T. M. Maxwell, production foreman for Stanolind Oil & Gas Co. at South Houston, has been transferred to Beaumont, Tex., as supervisor of field operations in the Spindletop area.

P. D. Phillips, Jr., has been appointed chief engineer of Humble Pipe Line Co., Houston, succeeding the late

P. D. PHILLIPS, JR.

F. O. STIVERS

C. H. Lundt. **F. O. Stivers** has been named assistant chief engineer. A graduate of Texas A. & M. College, Phillips began work with the company in 1934 as a pipe liner in the East Texas division. In 1949 he was named assistant chief engineer. Stivers is a graduate of Purdue University, and prior to joining Humble in 1945, he was employed with Southeastern Pipe Line Co. and Plantation Pipe Line Co.

H. A. Grimes has been elected a member of the board of directors of Creole Petroleum Corp., filling the vacancy left by the resignation of **C. L. Burrill.** Grimes joined Creole in 1922 as a field engineer, and with the exception of short temporary assignments in New York, and a period of 4 years (1945-49) when he was general manager of International Petroleum Co., Ltd., in Peru, he has been continuously in the employ of Creole in Venezuela.

Ray S. Waterman, assistant reserve engineer for Arkansas Louisiana Gas Co., has been named assistant chief production engineer, succeeding **William L. Craig** who has joined DeGolyer & MacNaughton, consulting enneers and geologists of Dallas. Craig had been with Arkansas Louisiana about 10 years. **Robert Sweeney** succeeds Waterman as assistant reserve engineer, and **Jack Mahoney,** junior engineer, has been named assistant reserve engineer.

H. C. Hall, field supervisor for Stanolind Oil & Gas Co. at Cement, Okla., has been transferred to Oklahoma City in the same capacity.

Russell M. Riggins, Houston, has been named president of McCarthy Chemical Corp., and Ulm Corp., a re-

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PERSONALS

cently chartered oil-well drilling firm. **Glenn McCarthy** becomes chairman of the board of both companies.

E. F. BATTSON

E. F. Battson, vice president and general manager of the Rocky Mountain region at Denver for Continental Oil Co., has been named administrative vice president at Houston. **W. C. MacMillian,** executive vice president, is to become senior vice president at Houston, and **J. W. Liddell,** regional manager at New York City, becomes vice president and regional general manager of the Rocky Mountain region at Denver. Battson, who has been with Conoco 30 years, was elected a vice president in 1948,

W. C. MacMILLIAN

J. W. LIDDELL

and became regional manager in 1949. MacMillian joined the firm 22 years ago, was elected vice president in charge of production in 1943; became vice president and administrative assistant to the president in January 1949, and executive vice president in September 1949. Liddell joined Conoco in 1926, was named manager of railway sales in 1941, and became regional general manager at New York in 1948.

Robert Davenport, party chief for Amerada Petroleum Corp., has been transferred from Fruita, Colo., to Commerce, Tex., in the same capacity.

Jim Walvoord, senior petroleum engineer for Humble Oil & Refining Co., has been transferred from New Orleans to Houston.

Jim Knauf, formerly gas analyst for Sinclair Oil & Gas Co. at Seminole, Okla., has joined U. S. Geological Survey as petroleum engineer at Artesia, N. M.

James G. Litherland, Jr., petroleum engineer for Magnolia Petroleum Co. at Falfurrias, Tex., has been transferred to Midland, Tex., as reservoir and evaluation engineer.

E. J. Poerschke, engineering supervisor for Gulf Oil Corp., has been transferred from Groves to Port Arthur, Tex.

John W. Boatwright, general manager of distribution economics for Standard Oil Co. (Ind.), has been named to the staff of the Petroleum Administration for Defense. Indiana Standard is lending Boatwright to the agency as a consultant on the petroleum industry's transportation needs.

O. K. WETZEL, JR.

Otto K. Wetzel, Jr., formerly employed on the engineering staff of the natural gas department of Magnolia Petroleum Co., has joined the staff of **Robert L. Purvin,** consulting chemical engineers of Dallas, as process engineer. He received his B.S. degree in chemical engineering at Massachusetts Institute of Technology.

Harold W. Yeargain, tool pusher for Basin Drilling Corp. at Big Spring, Tex., has been transferred to Stonewall County, Texas.

E. F. Cole, tool pusher for Humble Oil & Refining Co., has been transferred from Snyder to Odessa, Tex., in the same capacity.

James A. Reid has been granted a leave of absence from his position as assistant director of research for Phillips Petroleum Co. to accept an appointment by Reconstruction Finance Corp. as assistant manager, office of production, Washington, D. C.

P. F. BARNHART

Paul F. Barnhart, consulting petroleum engineer and independent oil operator, who for the past 8 years has been general manager of operations for **Frank** and **George Frankel,** independent oil operators of Houston, has left that firm to devote all his time to his personal oil operations and consulting work. Barnhart graduated from University of Oklahoma in 1937, and was employed by Barnsdall Oil Co. from that time until 1942 when he became consultant to the Frankels. He is vice president and director of the Independent Petroleum Association of America for the Southwest Texas area.

John Shaw has been elected an assistant treasurer by the board of directors of Gulf Oil Corp. He joined Gulf in 1930, and has been associated with the treasury department since that time.

J. E. Johnston, assistant to the district superintendent of Oklahoma Natural Gas Co., has been transferred from El Paso to the Oklahoma City district office.

G. H. Summers, party chief for Continental Oil Co., has been transferred from Sherman to Gainesville, Tex.

NEW YORK NOMADS OFFICERS.—Newly elected officers of the New York Chapter of Nomads are shown following a recent meeting. Seated, left to right: Fred J. Jobst, affiliated with Val B. Vittich, Jr., secretary; Howard B. Book, Reed Roller Bit Co., president; and Al Dill, Axelson Manufacturing Co., vice president. Standing, left to right: Henry J. McAdams, Jones & Laughlin Supply Co., regent; John D. Evans, Lucey Export Corp., treasurer; R. E. Elmore, Mid-Continent Cummins Export Corp., assistant sergeant-at-arms; George I. Lynch, Lee C. Moore Corp., assistant treasurer; Russ V. McIntire, Baker Oil Tools, Inc., sergeant-at-arms; and Kenneth D. Demarest, Fluor Corp., Ltd., regent. Arthur Harvey, Cardwell Manufacturing Co., Inc., assistant secretary, is not pictured.

PERSONALS

J. R. Wright has been transferred to Houston as district superintendent of the Houston and Beaumont districts of Magnolia Pipe Line Co.

J. C. MEYER

F. E. Melott, former area geologist and manager at Midland, Tex., for Deep Rock Oil Corp., has been transferred as area geologist to the new office at Wichita Falls, Tex. Succeeding Melott at Midland as area geologist is **J. C. Meyer.** Meyer, formerly an instructor in geology at University of Texas, entered the commercial geology field in 1947 through a position with Barnsdall Oil Co. at Midland. When Barnsdall merged with Sunray Oil Corp., in 1950, he transferred to Service Drilling Co., where he remained until the Deep Rock appointment.

Robert A. Dean, development geologist for Standard Oil Co. of Texas at Abilene, Tex., has been transferred to Gainesville, Tex.

H. K. Herr, seismic party chief for Kerr-McGee Oil Industries, Inc., has been transferred from Gainesville to McKinney, Tex.

G. H. Lawrence, junior petroleum engineer for Humble Oil & Refining Co. at Katy, Tex., has been transferred to the Hardin County, Texas, district, Gulf Coast division, as assistant to the district petroleum engineer.

T. C. Borland, division engineer for Stanolind Oil & Gas Co.'s Texas Louisiana Gulf Coast division at Houston, has been named assistant division production superintendent of the central division, succeeding **H. T. Hunter,** who has been transferred to the firm's Tulsa general office.

Thomas H. Philpott, geologist with Carter Oil Co., has been elected president of the Society of Economic Paleontologists and Mineralogists. Presently, he is in charge of the stratigraphic and paleontology laboratory for Carter.

A. M. McLachlin, exploitation engineer for Shell Oil Co. at Houston, has been transferred to Calgary, Alta., Canada, and **B. I. Schwartz,** exploitation engineer, has been transferred from Eagle Lake, Tex., to Kilgore, Tex. **R. B. Hale,** seismic party chief, has been named division geophysicist at Tyler, Tex.; **H. Simpson,** gang pusher at Kilgore, has been named production foreman; and **J. J. Plombon,** mechanical engineer, has been named gas engineer at the Sheridan, Tex., cycling plant. **N. B. Steuer** and **A. R. Torode** have joined Shell's Houston area exploration staff.

A. J. Juhas, formerly on the control laboratory staff of Tide Water Associated Oil Co. at the Bayonne, N. J., refinery, has been named supervisor of the analytical section. He is succeeded by **A. Vicedomini,** named group leader in the control laboratory standardization section.

C. W. Georgi, of Quaker State Oil Refining Corp., has been appointed to the executive committee of the Society of Automotive Engineers' fuels and lubricants technical committee, replacing **J. C. Geniesse** of Atlantic Refining Co., who completed his term in office. **M. D. Gjerde,** Standard Oil Co. (Ind.), continues as chairman of the committee, and new members include **W. P. Hilliken** of Pan-Am Southern Corp.

Neal McCaskill, district engineer for Atlantic Refining Co., has been transferred from Midland to Odessa, Tex.

Scott L. Taliaferro, formerly a petroleum engineer at Abilene, Tex., has moved to San Antonio where he will be an independent oil operator.

Riley A. Aucoin, assistant division petroleum engineer of the East Texas division of Humble Oil & Refining Co., has been transferred to the Louisiana division as supervising petroleum engineer. Other changes include: **E. E. Byrd,** transferred from the Gulf Coast division to the Winters district, North Texas division, as assistant district superintendent; **Philip E. Barber, Jr.,** division civil engineer, transferred from the Gulf Coast division to East Texas division in a similar capacity; **Harry D. Dickson,** senior supervising engineer, transferred from the civil-engineering division at Houston, to the Gulf Coast division as division civil engineer; **W. J. Bielstein,** senior petroleum engineer, transferred from Houston to the Southwest Texas division as supervising petroleum engineer; **Jack M. Sheperd,** supervising petroleum engineer, East Texas division, named assistant division petroleum engineer; **J. G. Calvert,** district petroleum engineer, London district, East Texas division, transferred to the East Texas division office as supervising petroleum engineer; **B. E. Crowder,** district petroleum engineer, Talco district, East Texas division, replaces Calvert; and **George C. Edgerton,** petroleum engineer in the East Texas division office, replaces Crowder.

D. Thomas Byrne, formerly engineer for Quaker State Oil Refining Corp. at Bradford, Pa., has been appointed field engineer for the production research laboratory of Pennsylvania Grade Crude Oil Association at Bradford.

J. L. Tatum, independent geologist and investor in oil properties, has moved from Durango, Colo., to Albuquerque, N. M.

R. H. Pearson, project engineer for Pure Oil Co., has been transferred from Columbus to Dayton, Ohio.

Henry E. Merrit, in charge of maintenance for Southeastern Drilling Co., has been transferred from Maracaibo, Venezuela, to Odessa, Tex.

H. O. Jones, foreman for Sunray Oil Corp. at Tulsa, has been transferred to Longville, La., in the same capacity.

Gene W. Huff, associate petroleum engineer for Humble Oil & Refining Co. at Houston, has been transferred to New Orleans.

William J. Scott, engineer for Creole Petroleum Corp. at Caracas, Venezuela, has been transferred to Elizabeth, N. J., as staff engineer for Standard Oil & Development Co.

DEATHS

Frank B. Bowling, 63, formerly with Mid-Continent Petroleum Corp. for 22 years before resigning in 1947, died January 25 in Guthrie, Okla., while on a business trip.

Arthur Samuel Lavender, boiler fireman with Crown Central Petroleum Corp., died January 23 at Pasadena, Tex.

J. Z. Hill, 70, retired purchasing agent for Gulf Oil Corp., died January 23 at Houston.

Henry Brosius Krohn, Sr., 50, retired oil operator, died January 18 at Houston.

Ralph C. Van Matre, 51, vice president and general manager of Mid-Continent division of Pacific Pumps, Inc., died January 11 in Wichita Falls, Tex., while on a business trip.

Harvey C. Davis, 65, retired assistant superintendent of production for Gulf Oil Corp., died January 29 in Tulsa. He had been an employe of the firm since coming to Oklahoma in 1917.

XUM

DRILLING RIG at Romere Pass field, drilling The California Co. 21 Romere Pass unit. (Industrial Aerial Photos, New Orleans.)

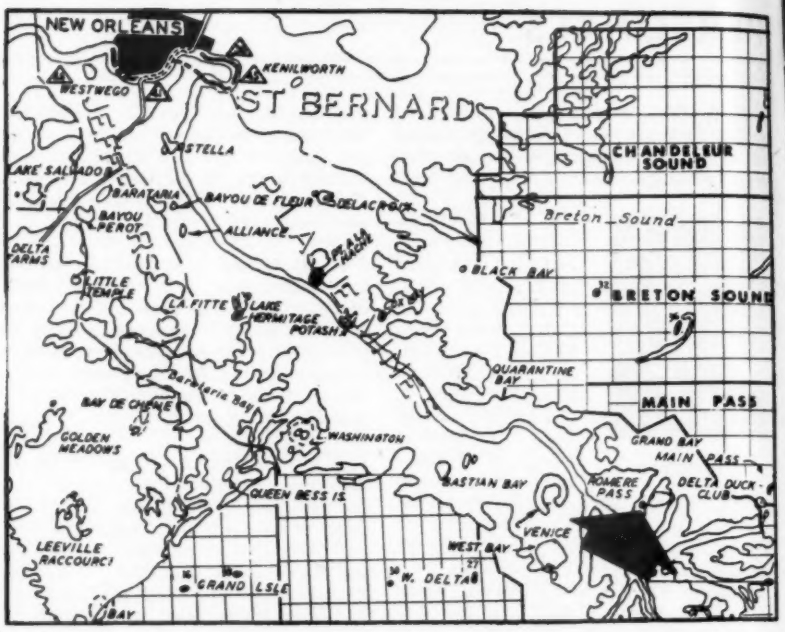


Fig. 1—Map showing location of Romere Pass field and its relationship to other producing fields at the mouth of the Mississippi River Delta in Plaquemines Parish, Louisiana.

PROGRESS REPORT: ROMERE PASS FIELD

by Joseph A. Kornfeld
District Editor

This Plaquemines Parish, Louisiana, field, located on a federal game refuge, is developed with submersible drilling barge on which is mounted a complete rig. It has 17 oil wells on production from two Miocene reservoirs at 9,000 and 9,700 ft. in depth. Problems unique to marsh development confronted The California Co. engineers.

AFTER 1 year of development, Romere Pass on the Mississippi River Delta has 17 completed oil wells producing 4,300 bbl. daily from a proven developed area of approximately 760 acres. The California Co., sole operator, plans to drill at least 14 additional wells which may prove an additional 560 acres.

Engineering difficulties unique in marsh development were mastered in the development of Romere Pass field. These problems related to geophysical exploration, dredging of location, use of submersible drilling barges, central tank battery, central treating and separation equipment, and central oil-barge loading-terminal facilities.

Federal Game Refuge

Romere Pass is unusual in that it lies within a federal migratory-game refuge. The area comprises one of the most important wild-duck and goose refuges in the United States.

This prospect was under lands purchased by the federal Government as distinguished from lands in the public domain. Leasing of these lands was authorized by an act of Congress of August 7, 1947. This enabling act provided that the consent of the agency having jurisdiction of the lands would be a prerequisite to the issuance of leases by the Bureau of Land Management. The lands in question were under the direct supervision of the Fish and Wild Life Division of the Department of the Interior.

Because this was the first time that the federal agencies had been concerned with the leasing of a wildlife refuge for oil and gas development, the leases were issued subject to various provisions and regulations for the protection of wild life. All operations must be handled so as to avoid disturbing the prime governmental function which is to maintain the existence as a game refuge. For example, location canals are surveyed so as to avoid disturbance of feedpond areas of the migratory fowl. Currently, only one rig is in operation during the winter season in order to make year-round development possible and still not disturb the feeding and nesting.

Leasing.—On August 20, 1947, Calco acquired options from the holders of applications for federal leases on some 7,000 acres lying between Grand Bay and Delta Duck fields in Plaquemines Parish, Louisiana. More than a year was required to consummate the necessary title work. A unit agreement was negotiated by The California Co. with the State of Louisiana, the federal Government, and other operators in the area.

Location.—Romere Pass is located about 10 miles east of the town of Venice in Plaquemines Parish on the delta of the Mississippi River. The field lies between Grand Bay on the northwest and Delta Duck field on the southeast, near the mouth of the river. The surface elevation is about 1 ft. above mean sea level.

Geophysical exploration.—A gravity survey combined with subsurface studies suggested the existence of an anomaly lying within the federal

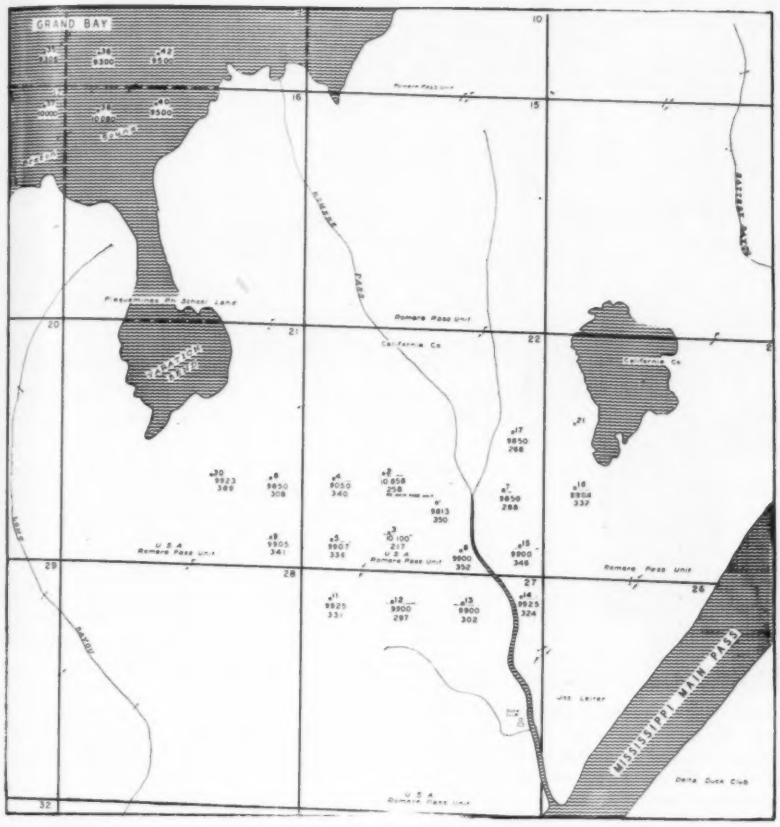


Fig. 2—Map of Romere Pass field, Plaquemines Parish, Louisiana. (Base map courtesy Zingery Map Co., Houston.)

ROMERE PASS OIL FIELD—PLAQUEMINES PARISH, LOUISIANA

METHOD OF EXPLORATION: Subsurface geology, gravity meter, seismograph.

DATE OF DOME DISCOVERY: 1947.

DATE OF FIRST OIL PRODUCTION: January 9, 1950.

DISCOVERY WELL: The California Co. 1 North Main Pass Unit (Romere Pass), 1,520 ft. north, 2,854 ft. east from the SW cor. 22-20s-19e.

GEOLOGY: Structure—deep-seated salt dome from geophysics, with well-developed shallow graben fault pattern; dome materials not reached in drilling to 10,858 ft.

PRODUCING RESERVOIRS:	Miocene 9,000 ft.	Miocene 9,700 ft.
Maximum saturated sand thickness	35	45
Gravity of produced oil, °A.P.I.	33-34	32-34
Average porosity, per cent	28	28
Average permeability, md.	500±	500±
Maximum obs. b.h.p.	*4,200	†4,531
Viscosity of reservoir oil, cp.	0.63	0.63
Solubility gas-oil ratio, cu. ft. per bbl.	626	751

*At —9,200 ft. †At —9,755 ft.

WELLS:

Flowing oil wells: (January 1, 1951) 6 11

Deepest well drilled: The California Co. 2 North Main Pass (Romere Pass), 2,120 ft. north and 1,754 ft. east from SW cor. 22-20s-19e, TD 10,858 ft. (Schl.). Completed April 12, 1950, 9,033-44 ft., IP 258 bbl. 35° oil (no water), per day, gas-oil ratio 600 cu. ft. per bbl.
Deepest formation tested: Upper Miocene.
Number of rigs active (January 1, 1951): 1.

PRODUCTION:

Cumulative oil production (to December 1, 1950): 480,955 bbl.
Current production (January 1, 1951): 4,300 bbl. per day.
Current allowable (January 1, 1951): 274 bbl. per day per well; 4,300 bbl. per day for field.

PIPE-LINE OUTLET: The California Co. 4-in. line to oil barge loading terminal along Main Pass.

game refuge. This feature was detailed by a reflection-seismograph survey run subsequently by a Calco crew which outlined a large, faulted, deep-seated salt dome. The limits of the structure were found to lie immediately north of the Main Pass of the Mississippi River. At first, it was called the North Main Pass prospect.

9,000-Ft. Discovery Well

On the basis of the findings, location for the first exploratory well was staked by The California Co. 1,520 ft. north of the SW cor. 22-20-19e, thence east 2,854 ft. to location. A canal was dredged to location in only 2 weeks. Loffland Brothers Co. was given a drilling contract for a 9,800-ft. test. A drilling barge was towed in and the well spudded in on December 10, 1949.

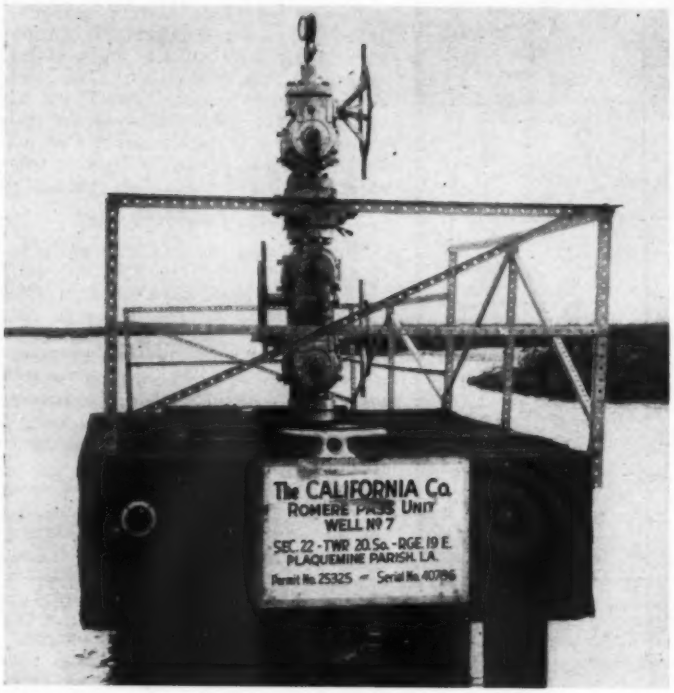
The 16-in. conductor pipe was set at 200 ft. At a depth of 2,010 ft. the 10¾-in. surface pipe was run. Six saturated sands were logged in drilling to a total depth of 9,813 ft. Important gas sands were found from 7,705-59 ft. and from 8,685-8,725 ft. After finding oil sand from 9,026-47 ft., a string of 7-in. pipe was set at 9,812 ft. for completion. Gun perforator was run to complete from 9,026-47 ft. with 126 shots. Initial potential was 350 bbl. of 32.9° oil and no water per day through a 9/64-in. choke with a flowing tubing pressure of 1,525 psi. Gas-oil ratio was 710 cu. ft. per bbl.

The maximum observed bottom-hole pressure was 4,200 psi. measured at a datum of 9,000 ft. subsea. Solution gas-oil ratio was 626 cu. ft. per bbl. at saturation pressure of 4,025 psi. as observed from laboratory analysis of bottom-hole sample.

Development of the new field followed a series of production tests of the discovery well. Loffland Brothers moved in barge for The California Co. for the northwest offset staked 2,120 ft. north and 1,754 ft. east from the SW cor. of Section 22. It was drilled to a total depth of 10,858 ft. or more than a thousand feet below the depth of the discovery well. However, 2 Romere Pass was plugged back and completed in the 9,000-ft. reservoir for an initial potential of 258 bbl. of 35° oil and no water per day through a 9/64-in. choke. Gas-oil ratio was 600 cu. ft. per bbl. of oil.

The name of the field was changed after completion of the second well from North Main Pass to Romere Pass by the Louisiana state geologist with the concurrence of the Department of the Interior. This was done to prevent confusion with other fields in the area using the name "Main Pass."

9,700-ft. pay completion.—A new and deeper oil reservoir, the 9,700-ft. zone, was brought into production on May 27, 1950, by Calco 3 Romere Pass, a diagonal southwest offset to the field discovery well. Noble Drill-



WELL-HEAD INSTALLATION.—View showing piling and protection around christmas-tree connections on The California Co. 7 Romere Pass unit. This well was completed on June 28, 1950, for an initial potential of 228 bbl. of 33.1° oil per day through an 11/64-in. choke with gas-oil ratio of 500 cu. ft. per bbl. from perforations at 9,032-48 ft. (Industrial Aerial Photos.)

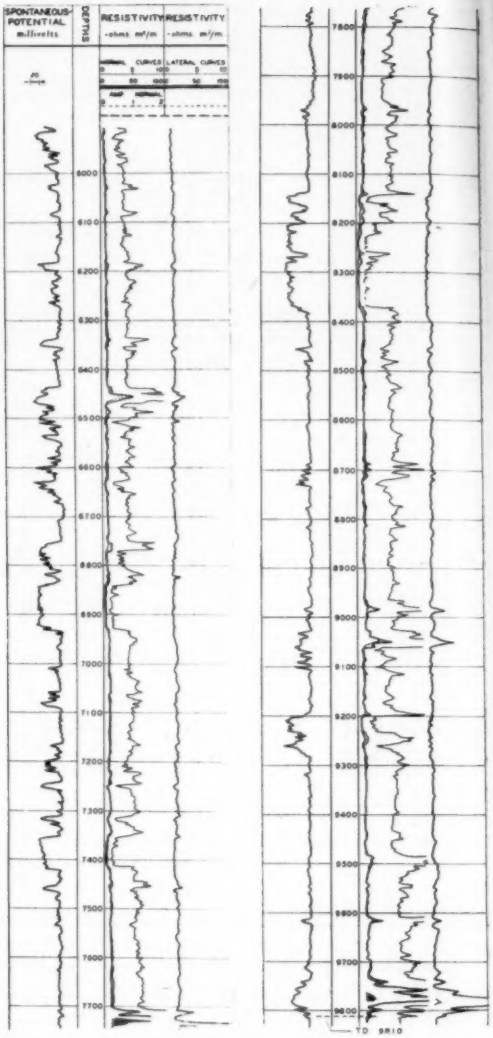


Fig. 3—Type electric log for Romere Pass deep-seated dome field. Section shown is from 6,000 to 9,810 ft. in The California Co. 1 North Main Pass. Section 22-20s-19e. Mud resistivity 0.84 ohms, m²/m. at 82° F. Electrode spacings AM = 16 in.; AM' = 64 in., AO = 18 ft. 8 in.

ing Co. was contractor on this well which was drilled to a total depth of 10,100 ft. The 7-in. pipe was set at 10,100 ft. and pipe perforated opposite 14 ft. of sand from 9,806-20 ft. The well drew an initial potential of 217 bbl. of 34° oil and no water per day through a 9/64-in. choke with a tubing pressure of 1,600 psi. and a gas-oil ratio of 1,050 cu. ft. per bbl.

Maximum observed bottom-hole pressure was 4,531 psi. at a datum of 9,755 ft. subsea. Solution gas-oil ratio as determined from laboratory analysis of bottom-hole analysis was 751 cu. ft. per bbl. at bubble-point pressure of 4,461 psi.

Drilling Methods

Loffland Brothers and Noble Drilling Co. have been employed in the development of the field.

Drilling barges. — A conventional submersible drilling barge is used upon which is mounted a complete rig. The barge measures 130 by 56 by 12 ft. It is constructed in two sections so that it may be split lengthwise to facilitate movement through locks and canals otherwise too narrow to accommodate the complete unit. The keyway length is approximately 60 ft. with a width of 8 ft. The barge is capable of submerging in 10 ft. of water.

Preparing location.—A location is prepared by dredging a rectangular area 310 by 110 by 8 ft. deep. A piling key (well protector) is driven 7 ft. 6 in. by 28 ft. The barge is floated over the location by tugs and submerged by opening sea cocks to allow flooding of ballast compartments. After a connection is made to a natural-gas fuel line (which has been laid from the nearest producing battery), the rig is ready to spud. A barge with the corrugated-iron house is moored alongside or in the rear of the drilling barge for storage of sack mud and chemical.

All well pipe, supplies, and service equipment, such as logging trucks and the like, are towed to the location on barges. All crew changes and personnel movements are performed by speedboat. After completion of the well, the ballast compartments are pumped out with the slush pumps to make the barge water-borne, and the rig is towed to the next location.

Derrick.—A 132-ft. steel derrick is mounted on a base 32 ft. square.

Draw works.—The draw works is capable of drilling to 15,000 ft. using 4½-in. drill pipe.

Drilling engines.—Standard arrangement employs three 280-hp. drilling engines equipped to use either natural gas or butane. The other rig is similar but is equipped with diesel-electric engines.

Mud pumps.—Three power-driven slush pumps are used with the following specifications: (1) 7¾ by 18 in.; (2) 7¼ by 15 in.; and (3) 6¼ by 12 in.

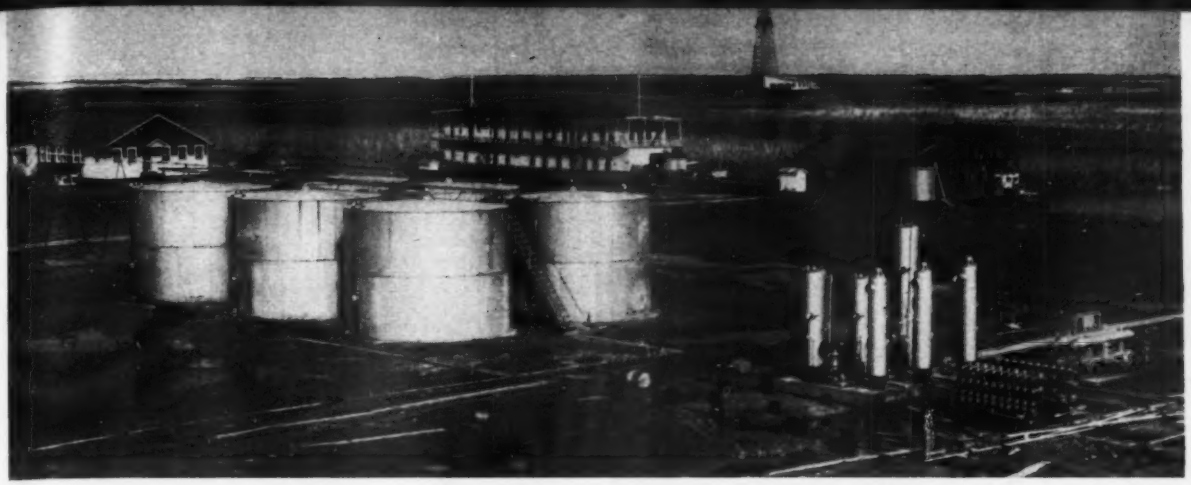
Mud pits.—Two rectangular steel mud pits are mounted on the barge deck for active pits. Surplus mud is stored in reserve tank compartments below the water line.

Drilling mud.—Natural mud is used from surface to 7,500 ft. At a depth of 7,500 ft. caustic-quebracho mud admixture is applied. The following table of mud weights and viscosities is typical of mud control practice followed in this field:

Depth (ft.)—	Mud weight (lb./gal.)	Viscosity, sec. A.P.I.
Surface	10	45
2,500	10	45
4,000	9.6	37
6,000	9.6	37
7,000	9.6	37
8,000	10.4	44
9,000	10.5	44
9,900	10.8	48

Casing and Cementing Practices

Contractor cuts a 20-in. hole to 200 ft. where a string of 200 ft. of 16-in. conductor casing is set. It is cemented with 300 sacks of common cement



CENTRAL TANK BATTERY.—View showing central facilities for crude-oil gathering, separation, and storage for Romere Pass field. Field headquarters are shown in background and in the distance a drilling well. (Industrial Aerial Photos.)

around the shoe and with 50 sacks of common cement pumped in around the outside at the top of the pipe. The latter step assures cement at the surface of the ground and affords protection from surface gas. Texas pattern beveled collar is used on the bottom.

Surface string.—A 14½-in. hole is cut to 2,500 ft. where the 10¾-in. surface string is run. It is cemented with from 1,300 to 1,400 sacks of common cement to assure returns of cement to the surface to provide a good bond between the 16-in. and 10¾-in. casings. Originally, Calco engineers designed a program calling for setting of 3,000 ft. of 10¾-in. casing, a practice followed at 2 North Main Pass. Later, this was changed to 2,000 ft.

Trouble was encountered while drilling subsequent wells in maintaining circulation at approximately 2,300 ft. In July 1950 this program was again changed to 2,500 ft. in order to case off the level where lost circulation was experienced. A float shoe and collar are run approximately 85 ft. apart in the surface string.

Long string.—At a depth of 2,500 ft., the hole is reduced and a 9⅞-in. bore cut to contract depth, usually 9,900 ft. The long string is set on bottom and is designed of mixed weights and grades of 7-in. pipe. It is cemented with 1,200 sacks of slow-setting cement.

A variation from this practice occurs when it is found that 1,200 sacks is insufficient to cover the top of any potentially productive oil or gas sand. Then a two-stage cementing collar is set at the top of the theoretical fillup of 1,200 sacks and sufficient cement is used to fill up at least 300 ft. above the topmost show; in this case, 1,800 sacks is the normal total, (1,200 sacks for the first stage and 600 sacks for the second stage). Float-shoe guide is used on bottom and float-collar set two joints (about 85 ft.) above show.

General cementing methods.—Self-propelled LCT - mounted, cementing units utilizing bulk cement are employed in all cementing operations in the field. All casing cementing jobs are calculated to use 120 per cent of the theoretical volume of cement to accomplish the desired fillup. Normal completion practice is to squeeze opposite the producing sand. At first, the practice was to squeeze in the interval to be perforated for production.

Current practice is to perforate and squeeze below the production zone, setting a cast-iron retainer below the interval desired to be perforated for production. This is done to eliminate the necessity for drilling out retainer and cement.

Normal squeeze job.—A squeeze job at Romere Pass for 9,000 and 9,700-ft. completions normally requires two 150-sack stages. Final and standing pressures desired are 5,000 psi. or greater. About 8 hours waiting time is allowed after the final squeeze before gun perforator is run for production shooting.

Hydraulic casing testing.—Before drilling out cement, casing tests are conducted on the 10¾ and 7-in. strings for a period of 30 minutes using clear water under 1,500-psi. pressure.

In lieu of drill-stem testing, extensive use of side-wall coring (a popular practice in South Louisiana Miocene fields) is made at Romere Pass. In 6 Romere Pass, as many as 45 side-wall cores were used to evaluate hydrocarbon reservoirs indicated from electric log from depths ranging from 6,400 to 9,700 ft.

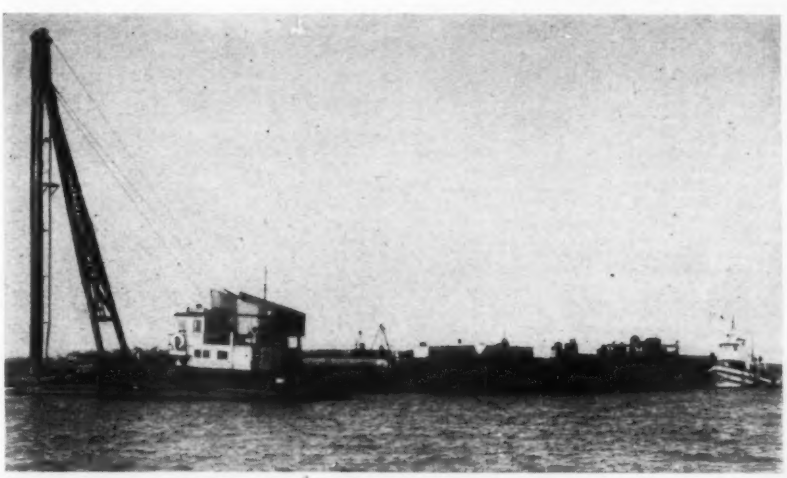
Selective perforating.—In completing wells from the 9,700-ft. oil reservoir, selective gun perforating is done. As many as three separate sets of perforations have been made in some wells. This is exemplified in 6 Romere Pass Unit as follows: 9,800-12 ft., with 72 shots; 9,816-20 ft., 24 shots; and 9,825-28 ft., 18 shots. A density of six shots per foot is developed.

Days to drill.—Wells completed in the 9,700-ft. reservoir require from 15 to 24 days to drill. An analysis of 11 wells indicates an arithmetic average of 21 days. The amount of side-wall coring and squeeze cementing may alter this figure.

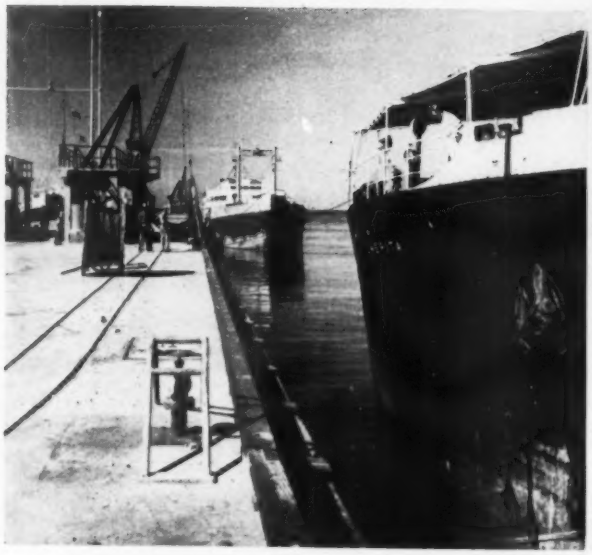
Producing Methods

All wells completed to date at Romere Pass are flowing oil wells.

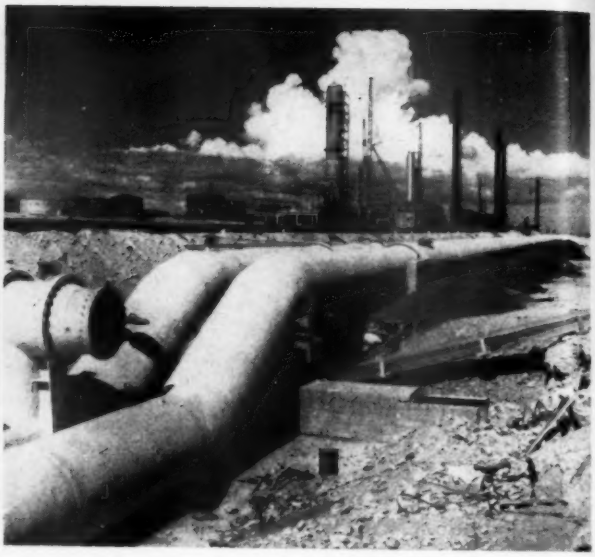
(Continued on page 77)



OIL TERMINAL.—Central oil-barge loading terminal on Main Pass serving nearby Romere Pass field. Pile driver is shown in foreground working on oil-barge mooring facilities. (Industrial Aerial Photos.)



AT PUNTA CARDON.—Tankers alongside one of the 450-yd. concrete piers.



PIPE LINE.—Carries salt water from the Bombeo salt-water station to refinery.

New Punta Cardon Refinery Will Be Second Largest in Venezuela

by V. S. Swaminathan*

Project involves erection of town complete with modern facilities

MAIN STORAGE YARD.—During construction of Punta Cardon refinery. Fractionating column in center background is 19 ft. in diameter and 85 ft. high.

SINCE the war the Royal Dutch-Shell Group has embarked upon major rehabilitation and new construction projects involving 15 refineries outside the United Kingdom. One of the most notable of these is the new complete refinery at Cardon in Venezuela, which will be the second largest in South America proper, entailing an outlay of £35,000,000 ($98,000,000 at current rate of exchange). The project involves erection of a town complete with all modern facilities.

In addition to the 60,000-bbl. per day refinery, now in partial operation, various services such as electric power and water have been provided to make the refinery a self-contained unit; roads and a harbor capable of handling up to 22,000-ton deadweight tankers were built. The modern town adjoining the refinery will eventually have a population close to 12,000.

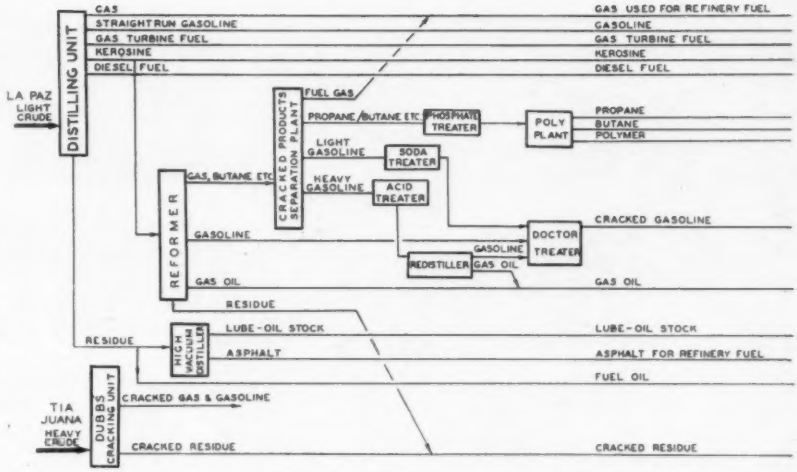
Planned in wartime and started in 1945, Cardon refinery's erection suffered from the universal man-power and material shortages of the period,

*5, Fielding Road, Bedford Park, London, W.4.

and the out-of-the-way location of the site. Despite these handicaps the crude-distillation unit went on stream in Feburary 1949.

Refinery location.—The Cardon refinery is located on a plot of 1,275 hectares with a coastal frontage of some 4 miles facing sheltered deep-water anchorage to the west. It handles crude oils produced by Shell in the area surrounding Lake Maracaibo, to which access by deep-sea vessels is blocked by the shallow Maracaibo Bar. The plant area, including jetties, plant facilities, tank farm, office, and laboratory, is laid out in the southern sector, while the northern part is utilized as the residential, social, and shopping area. In between the two lies a strip of open ground.

Strong, reinforced concrete jetties serve both freighters and facilitate rapid handling of materials. They are designed to provide four berths for shallow-draft lake vessels and four more for ocean tankers. The jetties are 1,250 ft. in length, the draft at the end being 47 ft. All lines are carried below the concrete decking of the platform.



Flow diagram shows processing of light and heavy crude at Punta Cardon.

Refinery Operation

The basic refinery units now in operation comprise atmospheric and vacuum distillation columns, a high-vacuum unit, two thermal cracking units, a reforming unit, gas-recovery and four treating units, redistillation facilities, and the polymerization unit. Construction is under way on a lube-oil plant, comprising the following units for the manufacture of high-grade lubricating oils: deasphalting unit (capacity 2,650 bbl. per day); furfural-extraction unit (6,350 bbl. per day); solvent-dewaxing unit (3,520 bbl. per day); and clay-contacting unit (3,700 bbl. per day). These units are scheduled for completion in the second half of 1951, and are designed to produce approximately 2,500 bbl. per day of lubricating oils.

Most of the refinery units were designed by Lummus Co. and Universal Oil Products Co., and some were of Shell's own design. Much of the refinery construction work was by Lummus; work on the jetties as well as concrete foundations for the refinery was done by Raymond Concrete Pile Co.; most tankage by Whessoe, Ltd., and the rest of the work done directly by the Shell organization aided by Venezuelan contractors.

Distillation.—The distilling unit is designed for 38,000 bbl. per day 34° A.P.I. gravity crude intake. It consists of a primary column, a secondary or vacuum column, a gasoline rerun column and a stabilizer. The primary and secondary columns have side-cut strippers to obtain the desired fractions. The end products of this unit are gas for refinery fuel, straightrun gasoline, naphtha, kerosine, gas oil, and residual fuel oil. There is a storage capacity of about 1,200,000 bbl. for refinery and storage crude.

The bottom product of the secondary column, a long residue, is redistilled in a high-vacuum tower, furnished with side-cut strippers to produce basic lubricating stocks and short residue. This unit is equipped with a caustic-extraction system to handle feed stocks containing naphthenic acid.

Cracking.—The two identical thermal cracking units, with a capacity of approximately 11,000 bbl. per day each, are designed for processing a heavy 13° A.P.I. crude, converting it into gasoline, gas oil, and a bunker fuel oil. In addition to the usual reaction and high-pressure flash chambers, the units are provided with a low-pressure flash chamber operating at about 5 psi., permitting an extremely deep flash of the cracked residue, with the flashed distillate recycled via the fractionating tower through the cracking furnace. The lightests fractions are charged to a gas-recovery unit together with similar fractions from the reforming unit. The latter is a conventional U.O.P. type, upgrading a low-octane straight-run naphtha into a motor-gasoline component.

Cracked products separation.—The gas-recovery unit consists of a rectifying absorber and stripper and a gasoline splitter. A dry gas, largely ethane and lighter components, is produced as absorber top gas. The absorber bottom is debutanized in the stripper, the stripper bottom being further fractionated in the gasoline splitter. The heavy gasoline is used as lean oil for the absorber, which is provided with a small section at the top where cracked gas oil from the crackers is circulated as absorption oil.

Products treating.—The treating plant consists of phosphate, soda, acid, and doctor treaters. The Shell phosphate process is applied for treating the C_3-C_4 fraction from the cracking and reforming units to remove H_2S. The treated fraction is then scrubbed with caustic, prior to being charged to the poly unit. After being given a prewash with salt water, cracked and reformed tops are treated countercurrently for removal of H_2S and mercaptans. The soda or light-tops treater is of the continuous mixing-settling type. The acid treater consists of two identical units for processing a heavy cracked gasoline with sulfuric acid in a countercurrent two-stage mixing-settling-type plant. The doctor treater is a conventional 1,850-metric-ton per day (15,725 bbl. per day) continuos unit for treatment of light and heavy cracked and reformed gasolines, the spent doctor solution being regenerated in a three-stage recovery unit.

In the redistillation unit, acid-treated gasolines are redistilled to remove the polymers formed during the acid treatment. The combined treated C_3-C_4 fractions are catalytically polymerized and subsequently stabilized to yield a polymer gasoline suitable for blending in motor gasoline.

Utilities

The turbines of the refinery's steam-generation plant are driven by 500-psi. steam, produced in three high-pressure boilers each having a capacity of 45,000 kg. per hour (99.255 lb. per hour). Feed water for these boilers is lime-soda treated in a water-softening plant, and later phosphate conditioned.

Virtually all pumps and spares are electrically driven, and power is furnished by four condensing turbines of a capacity of 10,000 hp., each one driving a 7,500-kw. generator-alternator. The electric supply for light and power is split over 16 transformer stations.

Water supply.—Salt water is employed for cooling and the fire-fighting system and fresh water for chemical solutions, boiler feed water,

(Continued on page 69)

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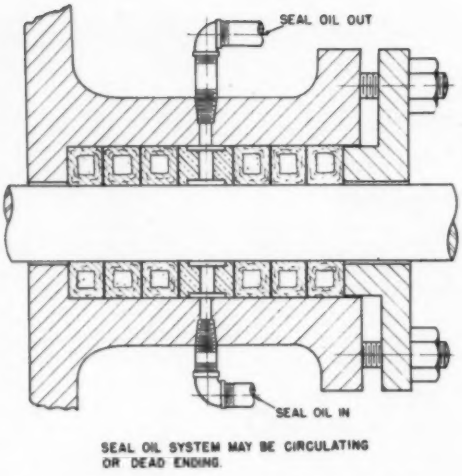


Fig. 1—Sealing liquid introduced into cage ring.

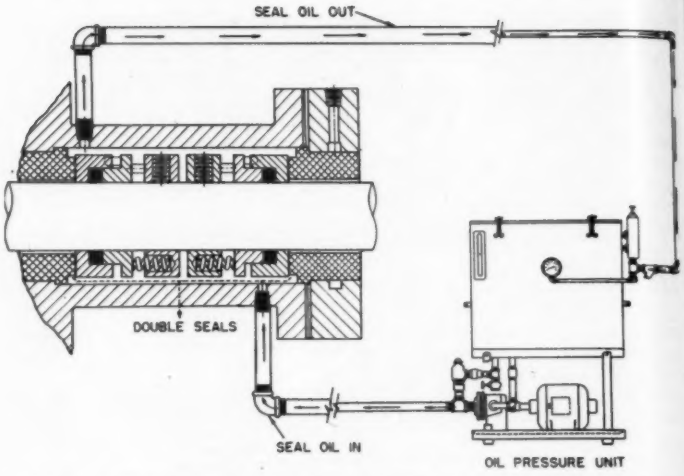


Fig. 2—Typical double seal installed in packing box employing seal oil.

MECHANICAL SHAFT SEALS

for general refinery service

by Albert Fanestiel*

IN today's modern oil refinery, many different pumping applications are encountered. These include the handling of various fluids such as fresh and salt water, sweet and sour crudes, acids and other chemicals, which may be toxic and corrosive; light volatile materials; heavy residua, distillates, and solvents. In general, the pumping temperatures range from —60° to 700° F. and the liquid pressures sealed against vary from below atmospheric to about 400 psig. Obviously with the many different materials and pumping conditions, oil refiners are confronted with numerous packing problems in which conventional packings, double and single mechanical shaft seals all find application.

*Assistant department head, maintenance engineering and inspection division, Baytown, Tex., refinery, Humble Oil & Refining Co.

Conventional packings for general services and the use of seal oil with packings and double mechanical seals for the more difficult sealing applications have been successful for many years. Single mechanical seals have come into more general acceptance and use by the oil industry in recent years. Some refineries now include single mechanical seals in their general pump specifications. Despite this general acceptance, the single mechanical seal cannot be considered as the answer to all sealing problems as packings and double mechanical seals continue to have their specific applications. A decision on whether packing, double mechanical seals, or single mechanical seals are to be used depends, in addition to the operating conditions, on the economic and safety aspects of the particular application.

With conventional packings a certain amount of leakage must be tolerated to provide lubrication and cooling for the packing. As a general rule, the tighter packings are held to minimize leakage, the higher the maintenance costs, due to sleeve scoring and packing replacements. In some instances a reasonable amount of leakage can be tolerated as in the case of water pumps and when han-

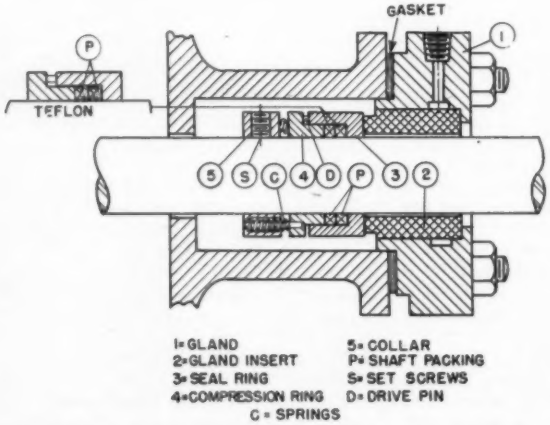


Fig. 3—Single mechanical seal for pressures up to 150 psi.

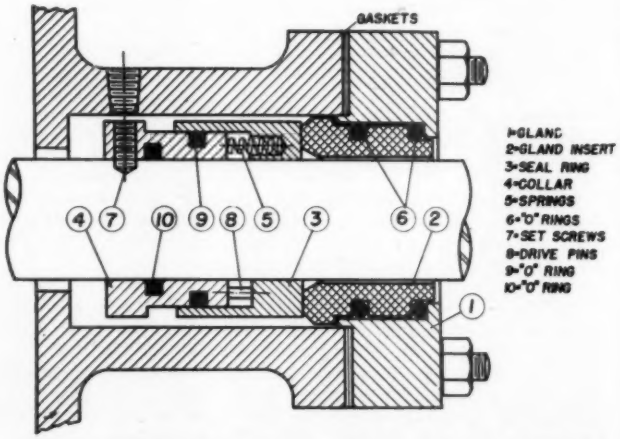
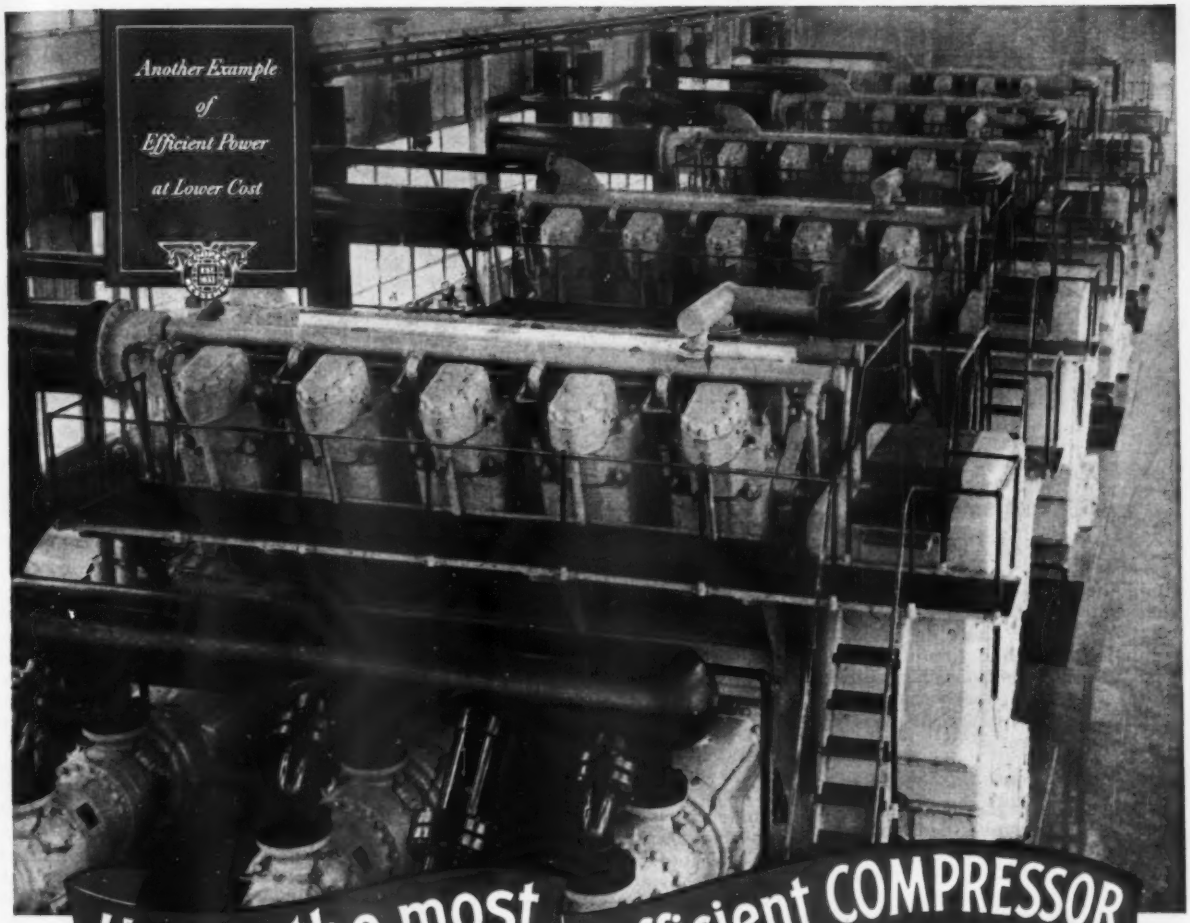


Fig. 3A—Typical single mechanical seal for pressures up to 600 psi.



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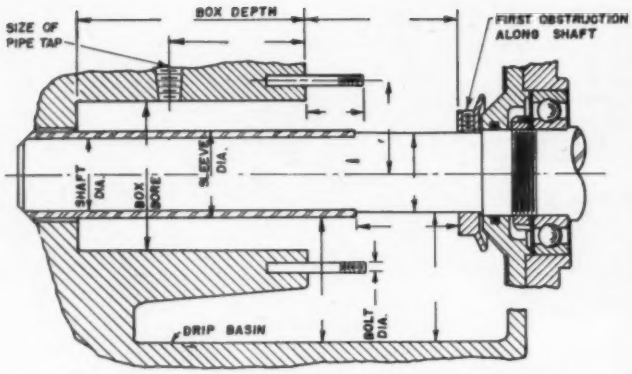

FLUID_____
TEMPERATURE_____
SUCTION PRESSURE_____
DISCHARGE PRESSURE_____

Fig. 4—Manufacturer's data sheet diagram.

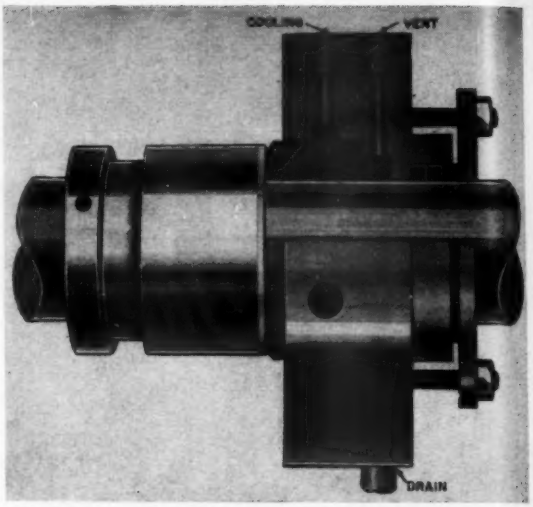

Fig. 5—Seal with auxiliary packing glands.

dling the heavier petroleum products that can be recovered at a nominal cost and where there is no appreciable loss or degradation of the stock. Under these conditions, long packing life is generally experienced and the installation of mechanical seals may not be warranted.

Sealing Liquid

When sealing against liquids having poor lubricating qualities, it is generally necessary to use a sealing liquid such as light lube oils, distillates, and in some cases water to lubricate and cool the packing. The pressure of the sealing liquid is held from 15 to 50 psi. above the pressure exerted on the packing box by the material being pumped. The sealing liquid is introduced into the packing-box cage ring as indicated in Fig. 1. The packing must be maintained sufficiently tight to minimize the loss of sealing liquid to the outside and into the pump stream.

In many instances, it is possible to justify the replacement of packing with double mechanical seals, employing seal oil, on the basis of reduced maintenance costs and seal-oil losses. Also to be considered in favor of the double mechanical seals is improved performance and added safety protection. A typical double seal installed in a packing box employing seal oil is shown in Fig. 2.

For many years, the trend was toward replacement of sealed packings with double mechanical seals using seal oil and in more recent years the trend has been towards replacement of double seals with single mechanical seals which do not require separate sealing systems. The use of double mechanical seals employing seal oil, however, is often warranted and is still standard practice with some refineries for sealing against high-temperature oil streams and toxic liquids such as acid-treated oil, phenol solutions, acids, and other chemicals.

The single mechanical seal has come into prominence during the last several years due largely to the development of new plastic and synthetic rubber materials which have solved many of the sealing problems previously encountered with this type of seal. A cross-section of a typical single mechanical seal for pressures up to 150 psi. is shown in Fig. 3. A seal for high pressures up to 600 psi. is shown in Fig. 3A. It will be noted that these assemblies are essentially the same as those employed on the double seal. The seal between the rotating seal ring (3) Fig. 3 and the pump shaft or sleeve is made by the packing (P). This packing is required to prevent leakage of fluid along the shaft and to accommodate movement of the rotating seal ring. The packing (P) is generally made in the form of an O-ring or V-type ring.

For most services up to 250° F. synthetic-rubber materials are satisfactory packings. V-type rings made of asbestos impregnated with synthetic rubber are being used for higher temperatures up to about 300° F. For temperatures up to about 400° F. and for sealing against materials such as phenol, methyl ethyl ketone solvents, acids, toluene, and other materials which have an adverse effect on synthetic rubbers, it has become the practice to specify packing rings made of one of the several high-temperature thermoplastic materials which are now available. These new materials are not only satisfactory for high-temperature services but are also resistant to all organic and inorganic solvents and corrosive agents. With these materials available, single mechanical seals are being applied to almost all sealing requirements found in a petroleum refinery except for high-temperature services above 400° F.

An examination of the costs for installing single-shaft seals of stainless-steel construction on several hundred pumps indicates that for general applications with seal sizes ranging from 1½ to 3 in. (shaft or sleeve sizes) the cost per seal (seal plus installation cost), varies from $150 to $250. The purchase cost of the seal is about one-half of the total cost. Cost of installing includes the expense of removing and replacing the pump rotating element, and replacing worn shaft sleeves.

An evaluation of the returns real-

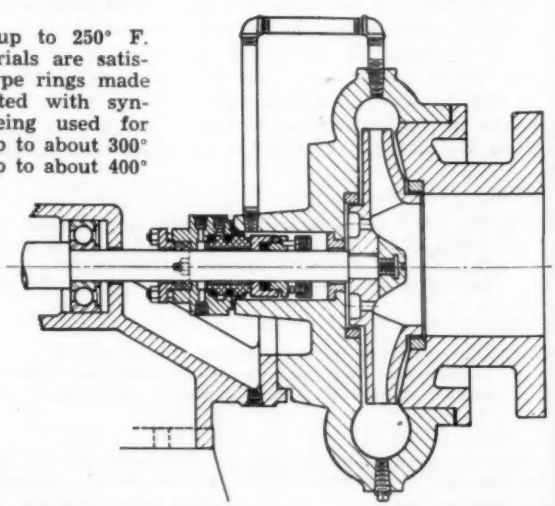

Fig. 6—Method of sealing packing box when under suction pressure. (All figures courtesy Durametallic Corp.)

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says W. C. Patton, owner of W. C. Patton Drilling Company, Stillwater, Oklahoma

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ized from the installation of single mechanical seals on about 150 pumps in general refinery services showed an average return of about 200 per cent on the investment. The return on individual pumps varied from 60 to 300 per cent. The cost of installing mechanical seals on any given pump and the returns to be obtained will depend on the following factors:

1. Pump design, operating pressure, and temperature. (These factors will affect the cost of packing maintenance as well as installing seals.)
2. Characteristics and the value of the materials pumped.
3. Cost of seal oil.
4. Amount of packing leakage, the amount recoverable, and the cost of recovering.
5. Loss of product quality or losses due to off-test products resulting from contamination of pump streams with seal oil.

In general it has been found that about 60 per cent of the total savings realized from the installation of mechanical seals results from the reduction in product losses and off-test products, about 15 per cent is derived from seal-oil savings, and 25 per cent from reduced maintenance costs.

Most mechanical shaft seals are simple in their construction and are fairly easy to install. While this implies that highly skilled technicians and specialists are not required for the proper installation and maintenance of seals, the seals are nevertheless constructed and finished to close tolerances and require extreme care when being handled and installed. Experienced pump mechanics can readily install and maintain mechanical seals provided they are given a working knowledge of the seal construction and its operating principles.

Some plants provide a rather detailed training program for their machinists engaged in seal work while in other plants only several mechanics are trained in the principles of seal operation, and they in turn instruct and give assistance to other mechanics. The seal manufacturers are naturally interested in their equipment being properly handled and installed and they are generally willing, particularly on initial installations, to provide the services of a trained mechanic or engineer to assist in such work. Much valuable information and assistance can usually be obtained by accepting this service.

Mechanical seals can generally be adapted to any standard pump without any major modifications. When purchasing seals for centrifugal pumps, it is essential that complete information be given on the characteristics of the materials handled by the pump, operating conditions, and details on the construction of the pump packing box. A typical data sheet showing the information required by one manufacturer for supplying a mechanical seal is shown in Fig. 4.

Mechanical seals of stainless-steel construction cost about 50 per cent more than seals constructed of carbon steel. Experience indicates that the additional cost for stainless steel is justified for most applications.

Special alloys of course should be used where the service conditions and liquids handled require or warrant such construction. It is also considered advisable to specify steel seal glands which cost about 30 per cent more than glands made of cast iron. When machine facing a pump case to provide a gasket surface for the gland, it is often necessary to undercut or recess the gasket seat on the case. This sometimes causes interference between the pump case and the gland and requires the use of a thick gasket or shims to allow pulling up the gland for proper compression of the gasket. This trouble can be eliminated by machining the packing gland with a raised gasket face.

Refinishing to Smaller Diameter

When installing seals on pumps that have previously been using packing, it is generally found that the shaft sleeves are worn to such an extent that the sleeves must be built up and refinished or replaced with new ones. Considerable expense can generally be saved, when the thickness of the sleeves permits, by refinishing the sleeves to a smaller diameter and purchasing seals to fit the smaller sleeves.

Mechanical seals equipped with auxiliary packing glands as shown in Fig. 5 are sometimes desirable when handling light volatile materials. The glands should be furnished with connections so that the box can be vented away from the pump, or smothered with steam or water.

It is considered standard practice when installing single mechanical seals to provide a flushing connection to the packing box. Flushing the packing box with a relatively clean cool fluid is advisable in order to carry away the heat generated at the seal faces, to purge the box of solids and gum-forming materials which might settle out and obstruct the flexing members of seal and prevent vaporization in packing box.

On single-stage pumps with the packing box under suction pressure, a connection is generally provided from the top of the pump case or the pump discharge to the packing box flushing connection. This arrangement is shown in Fig. 6. The fluid being pumped flows through the packing box to the suction side of the pump. There is generally sufficient clearance between the pump shaft or the shaft sleeve and the throat bushing to allow the proper amount of flushing fluid to pass. In the case of single-stage pumps with the packing box under discharge pressure the flushing line is connected from the packing box to the pump suction.

On multistage pumps with two packing boxes sealing at different pressures, a very simple flushing arrangement can be made by interconnecting the two boxes with a small line. The fluid being pumped then passes through the high-stage box to the low-stage box and back into the pump. In all cases, it is advisable to provide the flushing connections in the packing box as close as possible to the seal gland and the sealing faces so as to insure complete flushing of the box and seal faces.

The cause contributing to most premature seal failures is overheating of the seal. This is generally due to operating the pump dry while suction is being obtained or to operating the pump against a closed discharge valve. The most feasible way to correct this difficulty is to provide a line from the top of the pump case to the vapor space of the vessel from which material is being pumped.

While single mechanical seals are reliable and efficient sealing devices for rotating shafts, it should be recognized that they are precision built and extreme care should be exercised not only when handling and installing but also in their operation. The service obtained from a mechanical seal will depend in large part on the care and attention it receives in operation. In order to help insure the proper and successful operation of mechanical seals, some plants prepare instruction manuals which acquaint operating personnel with the principles and construction of the various types of seals being used and stress the limitation of the seals and the precautions necessary to insure their successful operation.

The instructions generally given to the personnel operating centrifugal pumps equipped with single mechanical seals can be summarized as:

1. Rotate pumps equipped with mechanical seals at least once each day.
2. Keep fluid pressure on seals when pumps are not in operation.
3. Keep the vent or equalizing line open when starting pump and during operation if there is danger of the pump losing suction or being shut in during operation.
4. Keep flushing lines open.
5. If the pump has water-cooled glands, make sure cooling water is going through gland before pump is started.
6. Remove ice formation from seals by blowing steam or by running hot water over the seal boxes.
7. Do not operate pump if it binds or is difficult to rotate; check pump.
8. If seals run hot, check pump operation and cooling water if provided. If seal continues to run hot, call pump mechanic.
9. Do not make any adjustments to seals; contact pump mechanic.
10. If pump has been shut down for more than 60 days, the seals should be inspected to insure that the shaft packing is not stuck to the shaft or fouled in any way.

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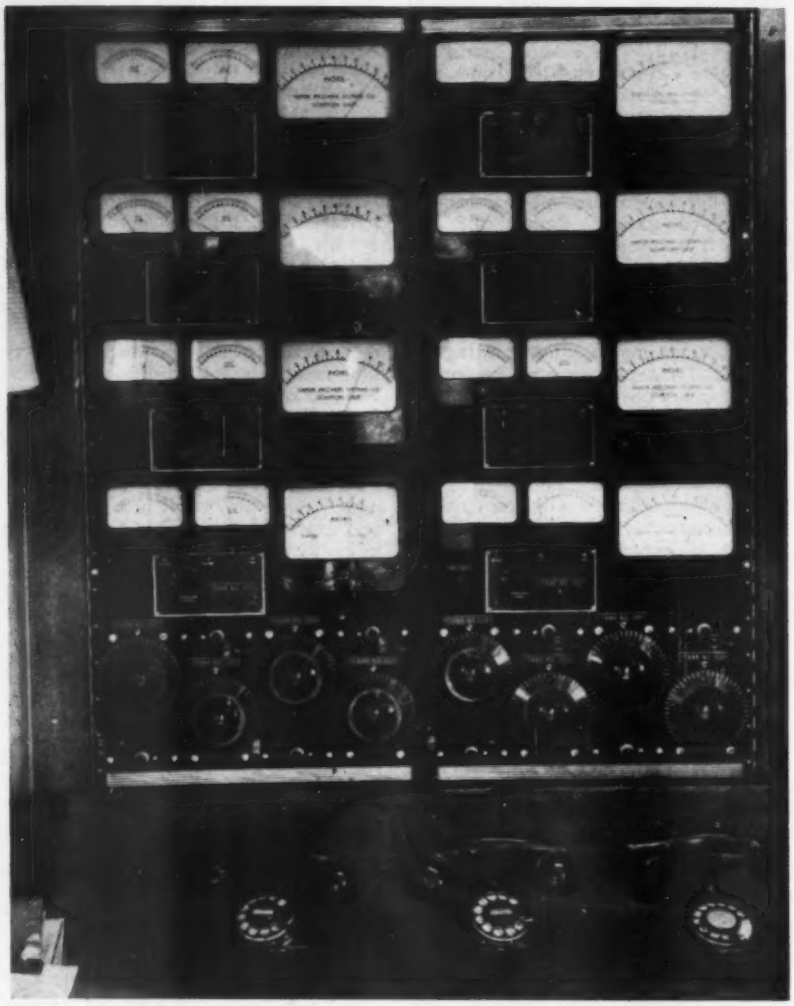
REMOTE TANK GAGING



Panel board in tank-farm laboratory on which the levels in eight tanks are simultaneously and continuously indicated. Each of the eight receivers also has high and low-level alarms.

New Shell System at Bakersfield Station Continuously Shows Levels in Eight Tanks

by D. H. Stormont
California District Editor

ON eight 68,000-bbl. tanks at its main-line pump station near Bakersfield, Calif., Shell Oil Co. recently completed installation of a versatile remote-gaging system. Several of the system's features, entirely new to West Coast operations, represent substantial contributions to accurate, safe liquid-level gaging from central stations.

Heart of the new electronic-type installation is a panel in the tank-farm laboratory, about 1,000 ft. distant from the farthest tank. Receivers mounted on this panel simultaneously and continuously indicate, with an accuracy of plus or minus ⅛ in., the gage readings of each of the eight tanks. High and low-level alarms operating in conjunction with each of the receivers can be adjusted to function at any 1/10-ft. interval between 0 and 50 ft.

Also installed in this cabinet is a regulating transformer which powers an auxiliary remote receiver placed in the pump room. At this receiver, by turning a dial-type selector switch, the pump station operator can instantaneously determine the liquid level in any one tank. By means of this hookup it is possible for the operator to determine the quantities being pumped while the gager maintains control over products stored in all tanks. Minimum wiring is made possible by connecting the same tank transmitter to both receivers.

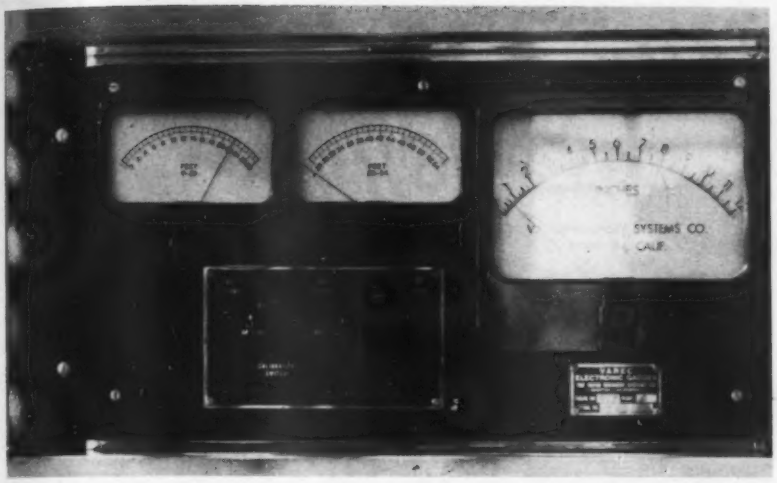
This system of remote gaging satisfactorily performs three important functions: (1) It provides operating information in all tanks at all times; (2) it obviates the necessity of the tank-farm gager making his rounds on foot except when tanks are to be switched, sampled, or gaged for final filling or shipping gages; this, of course, releases the gager for his other assigned duties, and (3) it enables the pump-station operator to determine for himself the rates and volumes of oil he is shipping without the necessity of the gager obtaining this information.

The high and low-level alarms on each tank serve a two-fold purpose: (1) To protect against overfilling tanks, there being up to four tanks receiving crude oil at any one time, and (2) to prevent tanks from being pumped below predetermined levels. In the operation of receiving tanks, the high-level alarm is set at a point 6 in. to 1 ft. below the desired maximum filling level. In pumping operations the low-level alarm is set at a point above the desired minimum level. An audible alarm is connected to ring if either level is reached. High or low-level alarm indication is chosen simply by turning a switch to the "Hi" or "Lo" position. In addition, when an alarm point is reached, a red indicator lights.

Another time-saving use to which these remote gages have been put is in connection with the blending of oils delivered simultaneously from two tanks to the pump station. With the central receiver in the gager's office, the rates and volumes of oil shipped from each tank can be determined at frequent intervals and adjustments made at the tanks as required. Thus the gager is able to maintain close control of blending operations with the necessity of frequent trips by foot to check the tanks.

Data on System

The remote-gaging system, installed by Vapor Recovery Systems Co., of Compton, Calif., employs an electronically regulated direct-current voltage of constant output to power electronic gager transmitters located at each of the eight tanks. The power unit, located in the base of the re-



Auxiliary remote receiver placed in pump room. By turning a dial, operator can determine fluid level in any one tank. This receiver enables pump-station operator to determine for himself rates and volumes of oil he is shipping.

ceiver in the field laboratory, supplies 85-volt, regulated direct-current voltage to the transmitter and receiver units. The 85-volt direct current sent to the transmitters is of very low current, in the order of 8 ma. Because of this low current, use of small-diameter wires between receivers and transmitters is permitted.

If the external source of power fails, the receivers do not go out of calibration. As soon as power is resumed the correct readings are immediately available.

Installation of Transmitters

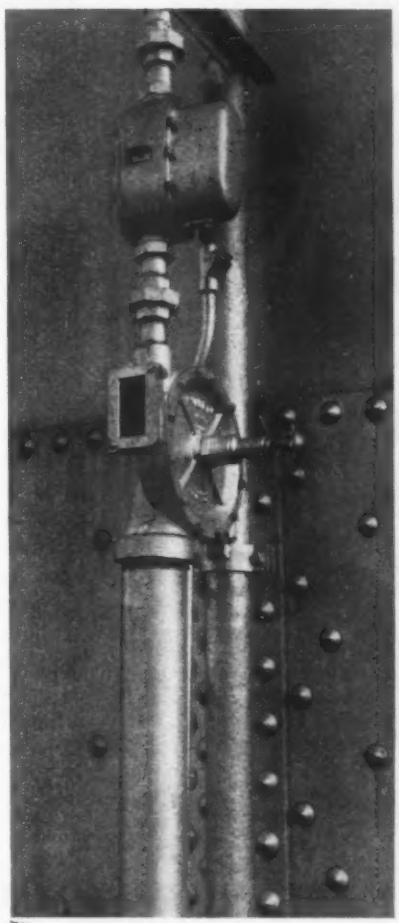
The transmitters installed at the eight tanks, each of which is connected to a receiver in the field lab by two common wires and two additional wires (No. 18 A.W.G.), work in conjunction with automatic tank gages. Two of the tanks are of the floating-roof type. On these the perforated gaging tape is actuated by a float contained in a well in the roof. On the other six fixed-roof tanks, the transmitters are driven by perforated tapes connected directly to floats inside the tanks. Look boxes installed just below the transmitters permit gaging at all tank sites.

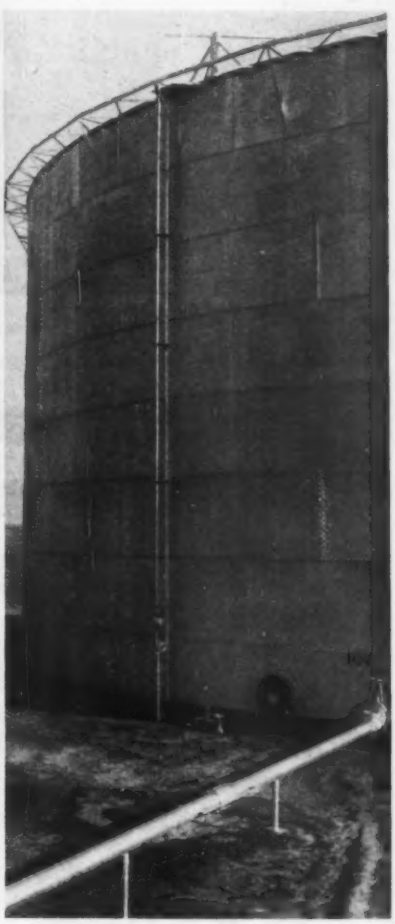
Within the transmitter the toothed-tape gage directly drives potentiometers contained on the opposite side of an explosionproof partition. One potentiometer picks up 1-ft. changes while the second transmits ⅛-in. variations to the inch receiver. Changes in the fluid level of any one of the tanks thus immediately influence the potentiometers, whose variations in turn are converted to direct readings in feet and inches at the remote receivers.

All potentiometers must receive the same voltage despite the differences in line-voltage drop occasioned by the tanks being at various distances from the receiver panel. This is accomplished through use of line compensation potentiometers in which various settings of resistance can be made, resulting in the effective line resistance being the same for all transmitters.

In the gager's office the receiver for each tank consists of two foot-reading dials and one which gives inch-readings. (All are volt meters with their scales calibrated in feet, or inches and one-eight inches.) One of the foot meters reads tank levels between 0 and 27 ft. and the other between 28 and 58 ft. Only one will register "on scale," however, when the receiver is in operation. Each change of 12 in. on the inch scale, up or down, causes the foot-needle to drop or step up 1 ft. This "scale step" feature eliminates the chance for error in taking the wrong foot readings.

The receiver in the pump room consists of a single set of foot and inch dials. A selector switch, however, permits the selective gaging of any tank as desired. This unit is of explosionproof design while those in the gager's office are of the positive-pressure, air-purged type.





Left: At each of the eight tanks electronic gager transmitters (in top housing) continually transmit fluid-level readings to the remote receivers. Look boxes on the automatic tank gage (lower unit) permit gaging at the tank site when desired. Right: The remote gaging system is installed on eight 68,000-bbl. tanks, two of which are of the floating-roof type shown here.

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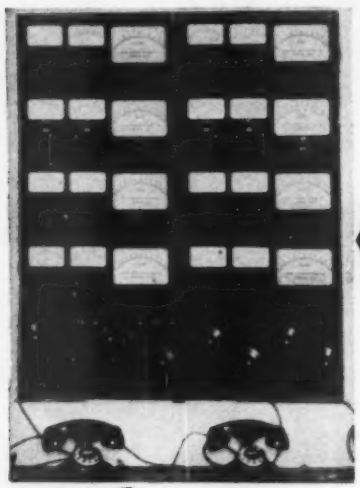

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Influence of Production Practice Upon

NATURAL-GASOLINE RECOVERY

—From Condensate Fields

by B. H. Sage*

ABSTRACT

In this paper, the influence of production methods upon the character of the hydrocarbons available for natural-gasoline-plant operation is indicated; and the effect of cycling upon the composition of the plant feed is estimated semiquantitatively. A number of assumptions are involved in these calculations and the effects of nonequilibrium conditions cannot be evaluated with accuracy. The results indicate a much greater quantity of components of intermediate volatility recovered from an underground reservoir by the use of pressure-maintenance techniques than is to be expected with more conventional withdrawal procedures. However, the increased recovery of components of intermediate volatility involves the cost of gas injection and the impossibility of disposing of the lighter hydrocarbon components as fuel during the early life of the field. The effect of the nonequilibrium behavior of hydrocarbons upon the recovery of natural gasoline from the gas phase of the reservoir is considered briefly. This paper presented at twenty-fifth annual meeting of California Natural Gas Association, Los Angeles.

THE natural-gasoline industry has been partly responsible for the increasing interest in the pressure maintenance of petroleum reservoirs. The phenomena of retrograde condensation[1] have been considered in detail by many authors.[2,3]

During the past two decades much effort has been devoted to the manipulation of production conditions to yield the optimum recovery of petroleum with a minimum of over-all effort. The importance of gas-cycling operations as a means of pressure maintenance has received attention in the current engineering literature.[4,5,6] It is the purpose of the present discussion to indicate semiquantitatively the magnitude of the increase in natural-gasoline recovery resulting from two types of production practices for a reservoir material of fixed initial composition.

A number of assumptions are required so that the problem can be solved with available data. It is believed that these assumptions do not seriously modify the applicability of the results to a field situation. In many instances marked deviation from the behavior described can be expected since the chosen conditions cannot be typical of many types of reservoirs.

Description of Situation

For the purpose of this discussion the field is considered to be composed of a gas phase located in the interstices of a consolidated sand which is wet with water. A subsurface temperature of 250° F. is assumed in conjunction with a reservoir pressure of 4,630 psia. The gas phase is presumed to be at upper or retrograde dew point as a result of separation by ground movements from the hydrocarbon liquids with which it may have been at equilibrium.

*California Institute of Technology, Pasadena.

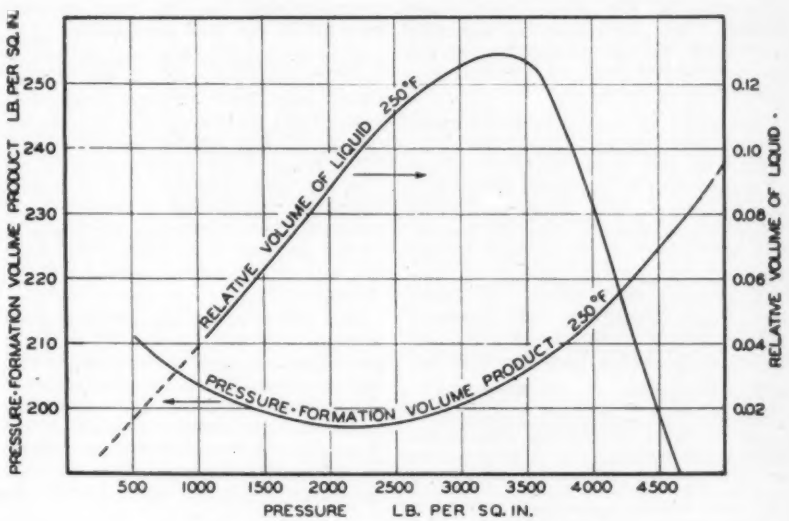

Fig. 1—Volumetric behavior of reservoir material.

TABLE 1—COMPOSITION OF RESERVOIR MATERIAL

Quantity—	Dry basis Mole fraction	Dry basis Weight fraction	Wet basis Mole fraction	Wet basis Weight fraction
Average molecular weight	32.3		32.14	
Weight fraction trap gas	0.5335		.....	
Gas-oil ratio*	5361.		.....	
Methane	0.7148	0.3549	0.7067	0.3509
Ethane	0.0826	0.0768	0.08166	0.07606
Propane	0.0526	0.0717	0.05200	0.07104
Isobutane	0.0110	0.0197	0.01087	0.01957
n-Butane	0.0222	0.0400	0.02194	0.03950
Isopentane	0.0081	0.0182	0.00801	0.01791
n-Pentane	0.0085	0.0190	0.00840	0.01877
Hexanes and heavier	0.0927	0.3893	0.09165	0.3896
Carbon dioxide	0.0076	0.0104	0.00751	0.01023
Water	.....	.....	0.001127	0.00629

*Expressed in cubic feet per barrel.

Composition of the reservoir material exclusive of water is set forth in Table 1. The quantity of water in the gas phase has been estimated from information concerning mixtures of methane, ethane, and water.[7] The data in Table 1 have been pre-

sented on both a dry and wet basis.

Volumetric behavior of the reservoir material, at a temperature of 250° F., is portrayed in Fig. 1. In this instance the pressure-formation volume product of the system as a whole and the volume of the liquid phase per unit weight of mixture have been presented.

Permeability of the consolidated sand is assumed to be sufficiently great for the production rates involved so that the pressure differences between one part of the field and another are small in comparison to the reservoir pressure. In many fields this situation is not realized. However, as a first approximation it serves as a basis to establish more readily the phase behavior of a petroleum reservoir. The temperature of the field will be assumed constant at 250° F. irrespective of the nature of the production cycle.

Two types of production operations will be considered. The first will involve a withdrawal from several points of the reservoir shown in Fig. 2. In this instance the free pore volume of the reservoir will be assumed to be constant. Some change in the volume available for the gas phase will result from the retrograde condensation of the hydrocarbons and water. The permeability, porosity, and sand thicknesses are considered uniform throughout the spatial extent of the field.

The second situation involves a gas-cycling operation utilizing the propane-free gas from a conventional gasoline plant to maintain pressure in the formation. It is assumed that no bypassing occurs and that the face of the "dry gas front" is vertical. In this instance the partial volume[9] of natural-gasoline components* is small[11] and little change in field pressure would result from withdrawal of these components. In a practical situation some additional gas probably would be added in order to maintain the pressure within the reservoir near the initial value. For present calculations it has been assumed that the pressure in the reservoir has remained invariant.

The two limiting situations probably would not be encountered in practice but it is believed that they serve to illustrate the trends experienced by following different production cycles. In the evaluation of the cost of recycling, the energy required has been computed on the basis of the isentropic compression of methane from 2,000 psia. to the field pressure.

*For the purpose of this discussion the natural-gasoline components will be considered as the paraffin hydrocarbons of a higher molecular weight than ethane. For convenience the recovery of propane and butanes and the n-pentane and heavier hydrocarbons has been treated separately. The hexanes and heavier were grouped as a single constituent[10] and have been treated somewhat arbitrarily in regard to their distribution.

Description of Calculations

Throughout calculations it has been assumed that equilibrium prevailed. It should be realized that this situation is not descriptive of field conditions and that significant uncertainties result from the omission of the effect of diffusional processes upon the production of natural gasoline. It was considered that the natural-gasoline plant received all of the fluid produced from the wells including both the hydrocarbon liquid and gas phases. The yield of natural gasoline will be based upon the quantity of hydrocarbons heavier than propane present in the well production.

On the basis of the assumption of equilibrium, behavior of the components may be estimated from data concerning the gas-liquid equilibrium ratios of the lighter hydrocarbons. Such ratios have been correlated by Hadden and others.[12,13] The values must be modified as a result of the rather high convergence pressures[14,15] of the systems of interest. This matter was considered in detail by F. W. Winn.[16]

The values of the equilibrium ratios employed do not necessarily describe the phase behavior of the system with good accuracy. However, it is believed that they represent the situation with sufficient certainty to justify confidence in the semiquantitative aspects of the results obtained. The volumetric behavior of the liquid phase was estimated from the partial volumes of the components.[17,18]

The methods employed in carrying out the stepwise calculations concerning the equilibrium behavior of a system of variable weight are somewhat tedious. In this instance a unit volume of free pore space was taken as a basis. In the case of the first production process the system is isochoric and isothermal and involves only the withdrawal of the equilibrium gas phase. At each state the properties of the individual phases and of the system as a whole were related to one another by the group of expressions which follow.

Compositions of the coexisting phases at a specified state are related by:

$$\sum_{k=1}^{k=n} \frac{y_k}{K} = \sum_{k=1}^{k=n} x_k = 1 \qquad (1)$$

$$\sum_{k=1}^{k=n} y_k = \sum_{k=1}^{k=n} K_k x_k = 1 \qquad (2)$$

$$\left|_{k=1}^{k=n}\right. N_k = N_g y_k + (1 - N_g) x_k \qquad (3)$$

Volumetric behavior of the liquid phase was established from the associated partial volumetric data thus:

$$V_l = \sum_{K=1}^{K=n} V_{kl}\, x_k \qquad (4)$$

Specific volume of the mixture in the heterogeneous region was determined from Equation 5.

$$V = V_g n_g + V_l (1 - n_g) \qquad (5)$$

Throughout all withdrawal operations it was assumed that all fluid in the reservoir remained at a temperature of 250° F. and at the pressure prevailing. Furthermore, only the gas phase was withdrawn. Any of the material which condensed in the reservoir was considered as becoming associated with the water and consolidated sand and was not produced.

For present purposes all the calcu-

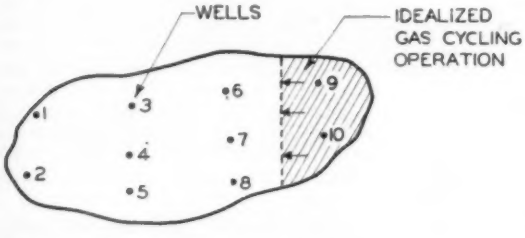

Fig. 2—Schematic diagram of reservoir.

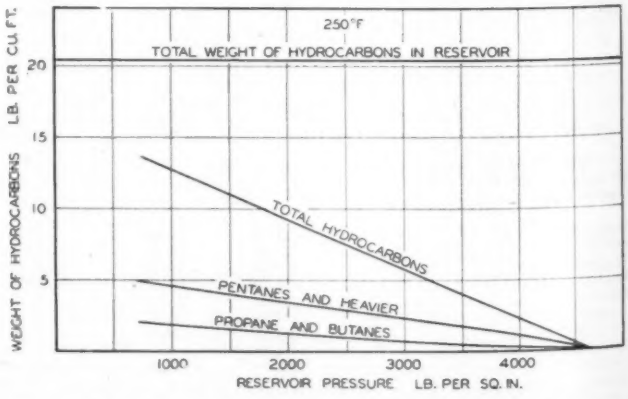

Fig. 3—Weight of products withdrawn as function of reservoir pressure.

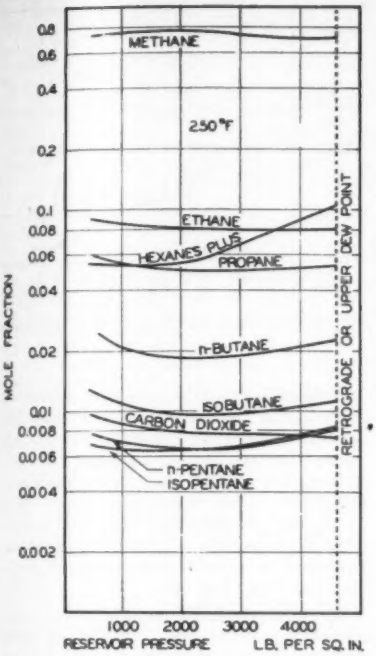

Fig. 4—Composition of material withdrawn upon a dry basis.

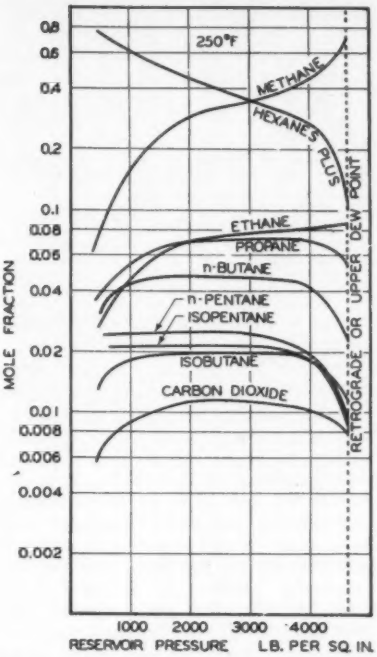

Fig. 5—Composition of liquid phase remaining in reservoir.

lations have been based upon 1 cu. ft. of original pore volume filled with hydrocarbon gas. No change in this pore volume from the change in pressure was considered. However, the decrease in this volume as a result of the deposition of water and hydrocarbon liquids accompanying the changes in pressure has been taken into account. Available information on the volumetric properties and limited data on the phase behavior of the fluid from a California field[19] have been used as a basis for these calculations.

The experimental data available[19] for the material described in Table 1 do not establish the distribution of the components between the phases. To obtain this distribution the data of Hadden[12,13] as modified by Winn[14] have been employed. The convergence pressure[14] was adjusted to correspond to a dew point which agreed with that determined experimentally.[19]

In principle, the stepwise calculations involved the determination of the composition of the coexisting phases as a function of the reservoir conditions. Under situations where the pressure is constant, the change in weight of each of the components in the field may be established from Equation 6.

$$\left|\begin{matrix} k = n \\ \sum \\ k = 1 \end{matrix}\right. dm_k = Y_k\, dm \qquad (6)$$

In the case of a heterogeneous system the composition of the material withdrawn is identical to that of the equilibrium gas phase. Under these circumstances a change in composition of the system as a whole may be established from the relation, Equation 7.

$$dn_k = n_g\, dY_k + (1 - n_g)\, dX_k + (Y_k - X_k)\, d\,n_g \qquad (7)$$

To determine the volumetric behavior of the system as a whole, it was assumed, as in the basic experimental work,[19] that the specific volume was a function of the weight fraction of n-butane and lighter hydrocarbons and the prevailing pressure and temperature. On the basis of this assumption, in Equation 8 the pressure could be established after the withdrawal of a finite increment of the gas phase. In this instance the specific volume was determined from Equation 8.

$$V = v/m = 1/m \qquad (8)$$

The differentiation of Equation 8 results in Equation 9.

$$m^2 = -\,dm/dV \qquad (9)$$

It is necessary to determine the pressure of the heterogeneous system from the expression:

$$P = f\,(T, P, n_g) \qquad (10)$$

The nature of this functional relation was established from the experimental data concerning the system.[19] The pressure was determined by suitable graphical interpolation of the experimental data. By the use of Equations 8, 9, and 10 it was possible to determine the quantity of materials withdrawn from the unit volume within the reservoir between any specified pressure limits.

From information concerning the weight of material removed from the reservoir and its composition, the quantities of propane and butanes, and of pentanes-and-heavier produced were determined as a function of the reservoir pressure.

Such calculations were carried out for an isochoric reservoir with no repressuring. A detailed description of the stepwise process employed for this set of conditions is available.[20] A second situation was also treated, involving an isochoric reservoir provided with sufficient recycled propane-free gas to maintain the pressure invariant.

Normal Withdrawal

Upon the basis of withdrawal of a gas phase from an isochoric reservoir

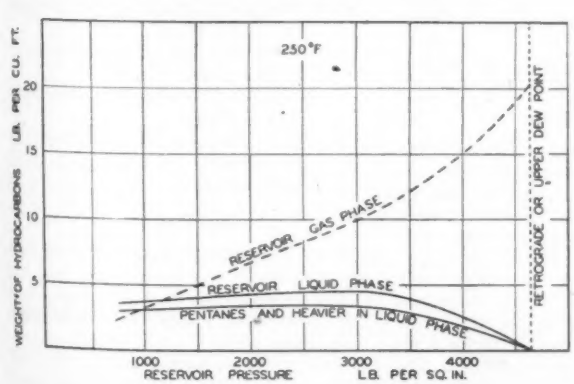
250°F
RESERVOIR GAS PHASE
RESERVOIR LIQUID PHASE
PENTANES AND HEAVIER IN LIQUID PHASE
RETROGRADE OR UPPER DEW POINT
WEIGHT OF HYDROCARBONS LB. PER CU. FT.
RESERVOIR PRESSURE LB. PER SQ. IN.

Fig. 6—Weight of hydrocarbons in liquid phase within reservoir.

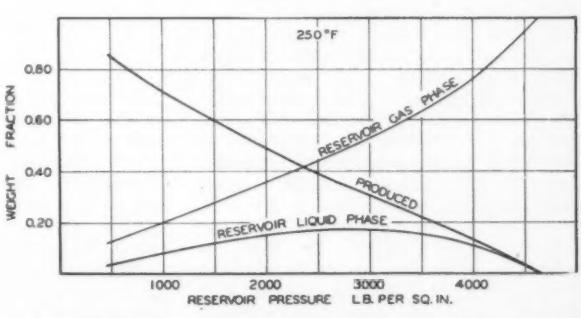

Fig. 7—Distribution of pentanes and heavier expressed in fraction of this constituent present.

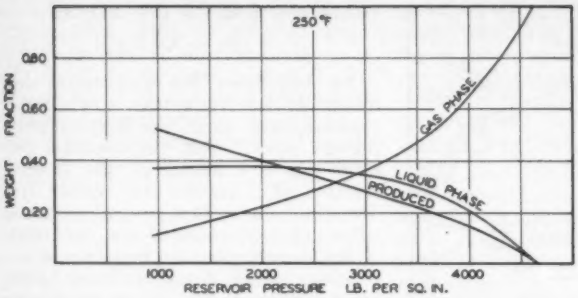

Fig. 8—Distribution of propane and butane expressed in terms of fraction of this constituent originally present.

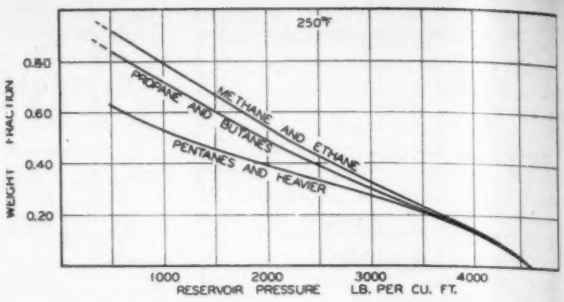

Fig. 9—Production of constituents as a function of field pressure.

the weight of hydrocarbon material withdrawn from the system per cubic foot of original free pore space in the reservoir is presented in Fig. 3 as a function of declining reservoir pressure. The weights of water, propane and butanes, and pentanes and heavier hydrocarbons are also shown. The initial reservoir content is indicated in the figure.

Composition of the gas phase, or natural-gasoline-plant feed, upon a dry basis as a function of reservoir pressure constitutes Fig. 4. These data were computed from the expressions set forth in the preceding section and were based upon the work of Hadden[15] and Winn.[16] It should be realized that the equilibrium ratios employed may not be strictly applicable to the system in question. Therefore, the data of Fig. 4 are at best semiquantitative.

Fig. 5 presents the composition of the hydrocarbon liquid phase in the reservoir as a function of pressure. The mole fraction of methane decreases rapidly while that of pentanes and heavier hydrocarbons increases as the pressure is decreased.

Fig. 6 presents the weight of the gas and liquid phases in the reservoir of pentanes and heavier hydrocarbons. In addition the weight in the liquid phase is included. These data indicate a rapid increase in the quantity of pentanes and heavier hydrocarbons with a decrease in reservoir pressure followed by a slight decrease in these components as the pressure is decreased below 1,000 psia.

Fig. 7 shows the fraction of propane and butane originally present that is found in the liquid and gas phases of the reservoir. These data indicate that approximately 18 weight per cent of the propane and butane originally in the gas phase is found within the liquid phase of the reservoir when the pressure has been decreased from its initial value of 4,630 to 2,500 psia. Similar information is given in Fig. 8 for the pentanes and the heavier hydrocarbons. In this instance at 1,000 psia. about 38 per cent of the original pentanes and heavier hydrocarbons are in the liquid phase of the reservoir and only about 52 per cent of them have been produced.

The quantity of the several classes of hydrocarbon produced as a function of reservoir pressure is indicated in Fig. 9. When the field is depleted to a pressure of 500 psia., approximately 91 per cent of the methane and ethane originally available will have been withdrawn while only 58 per cent of the pentanes and heavier originally present will have been produced. In the same period, approximately 85 per cent of the propane and butanes will have been brought to the surface while 3 per cent of the original will now be in the liquid phase dispersed throughout the reservoir. These data serve to illustrate the large amount of the hydrocarbons of intermediate molecular weight which are retained in the reservoir as a result of the gradual condensation from the gas phase as the pressure is progressively lowered.

Isobaric Production

If it is assumed that sufficient methane and ethane are returned to the formation to maintain the pressure invariant throughout the effective production history of the field, the composition of the plant feed will remain constant and will be equal to that of the reservoir fluid recorded in Table 1 as long as no bypassing or diffusion are considered. The energy required to cycle the gas is about 1,000 B.t.u. per cubic foot of hydrocarbon filled space in the reservoir. In this instance the power required was assumed to be twice that necessary for isentropic compression of methane from 2,000 to 4,630 psia. In theory all of the propane and heavier hydrocarbons can be produced if the pressure is maintained.

Conclusions

Calculations indicate that if the cycling or pressure-maintenance operation had not been carried out in the hypothetical field chosen for this illustration, approximately 15 per cent of the propane and butanes and 37 per cent of the pentanes and heavier hydrocarbons would have remained underground at the time the field pressure had been decreased to approximately 10 per cent of its original value. Water encroachment and surface forces might well have prevented the ultimate production of significant parts of this remaining material by any presently available, economic production practice. In addition, the plant feed for a natural-gasoline plant operating upon conventional withdrawal techniques would undergo marked changes in pressure and composition as was illustrated in Fig. 4.

In the case of pressure maintenance the plant feed would not vary greatly during the production life of the field. However, against the abovementioned advantages of a cycling program must be charged the cost of the power required and the investment in compression equipment for operation of the gas cycling process.

Acknowledgment

The author wishes to acknowledge the help of Betty Kendall and Elizabeth McLaughlin with the calculations on which the figures in this paper are based.

Nomenclature

d = Differential operator
K = Equilibrium ratio, = y/x
m = Weight of system, lb.
n = Weight fraction of component in system
N = Mole fraction of component in system
P = Pressure, psia.
T = Absolute temperature, °R.
V = Specific volume, cu. ft. per lb.
v = Total volume, cu. ft.
V = Partial volume, cu. ft. per lb.
X = Weight fraction of component in liquid phase
x = Mole fraction of component in liquid phase
Y = Weight fraction of component in gas phase
y = Mole fraction of component in gas phase
Σ = Summation

Subscripts

g = Gas phase coexisting with liquid
k = Component of a mixture
l = A liquid phase coexisting with gas

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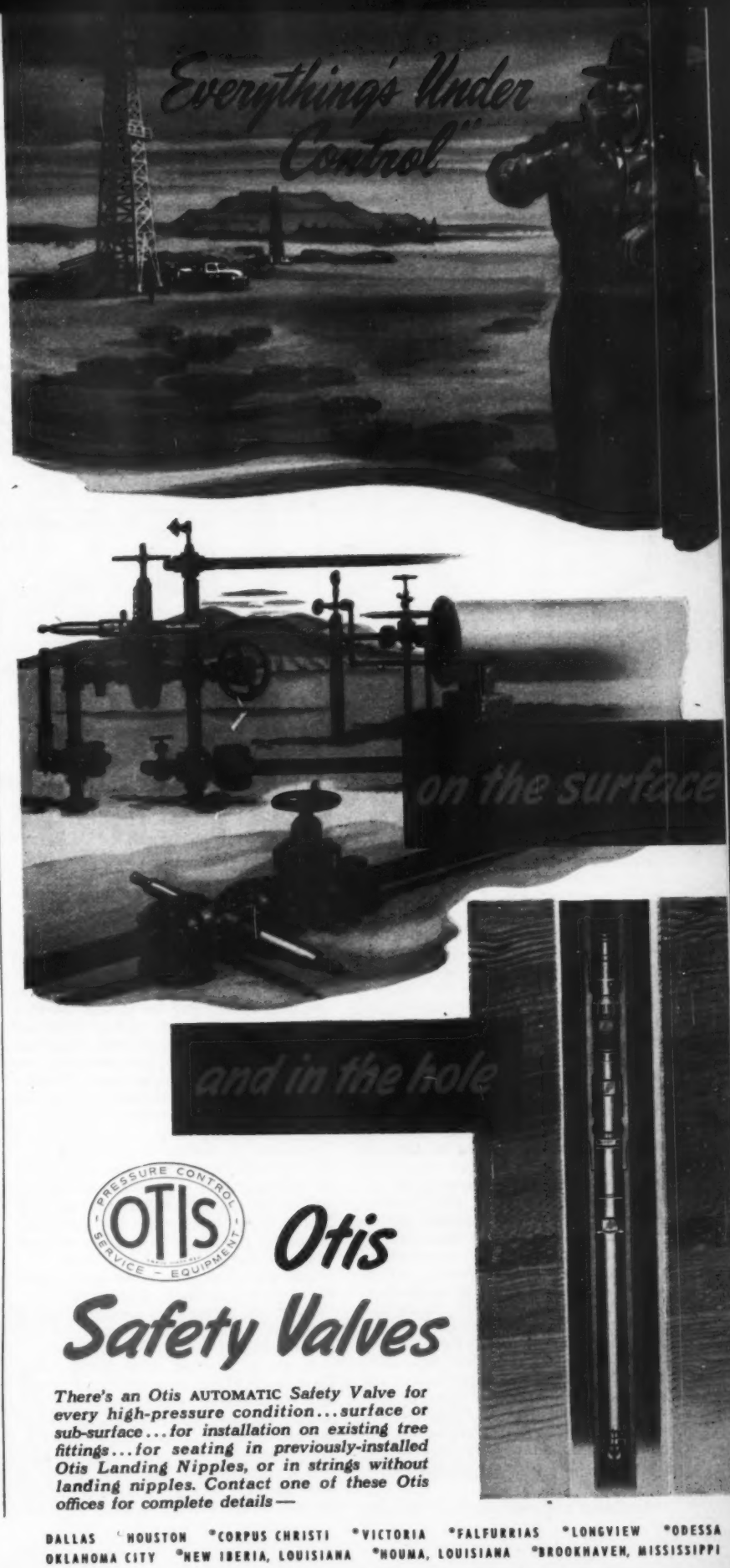
Punta Cardon Refinery

(Continued from page 55)

and domestic water. Following the completion of the lube-oil project it is anticipated that approximately 30,000 tons per hour (189,000 bbl. per hour) of cooling water will be used in once-through operation, needing no cooling towers. Currently there are two electric-driven and two turbo-driven centrifugal pumps, each with a capacity of approximately 6,000 tons per hour (37,800 bbl. per hour). One electric-driven and two diesel-propelled pumps, each of 500-tons per hour capacity (3,150 bbl. per hour) are installed as fire pumps. Fresh water is now being supplied through the 30-34-in. pipe line joint venture of Shell, Creole, and the Venezuelan Government gravitating water over a distance of 80 miles from Coro on the mainland, to Cardon, as well as to Creole's Amuay Bay refinery.

The four new major refineries in Venezuela involve an outlay of nearly $460,000,000. They are Shell Cardon (60,000 bbl. per day); Creole, Amuay Bay (60,000 bbl. per day); Venezuelan Gulf Texas Petroleum, Puerto La Cruz (40,000 bbl. per day); and Venezuelan Petroleum (Sinclair) (35,000 bbl. per day). These will add 195,000 bbl. per day to Venezuela's crude-processing capacity. Including the immediate offshore islands of Aruba, Curacao, and Trinidad, whose refineries process Caribbean crude, Venezuelan refineries exceed 1,000,000 bbl. per day in charging capacity.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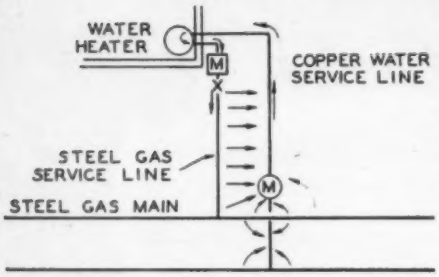

Fig. 1 — (Left) Corrosion of steel gas service line by galvanic action with adjacent copper water service line. Destruction of gas line can be arrested by installing insulated joint at point x.

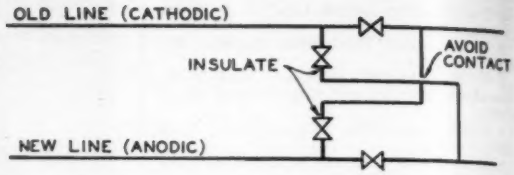

Fig. 2—Cross-connection permits the galvanic action between new (anodic) and old (cathodic) steel to act, to the detriment of the new steel. Insulation installed at indicated joints interrupts flow of current and arrests corrosion.

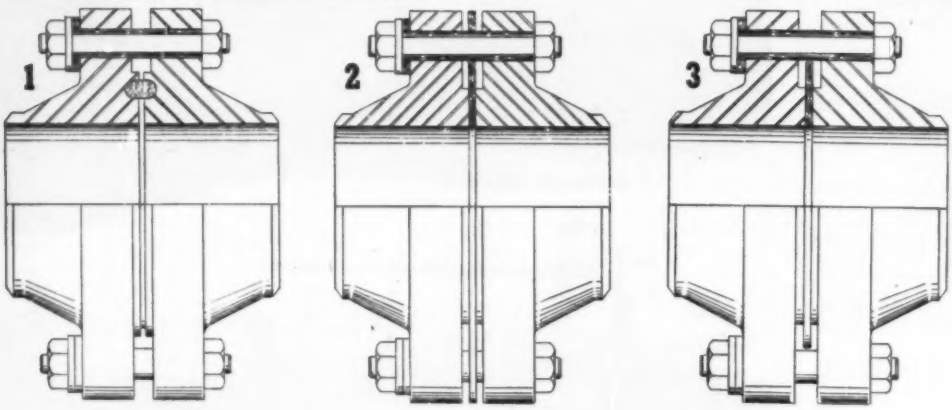

Fig. 3—(Left) Three types of gaskets used in insulating flanged joints: (1) Ring-joint flange, gasket circular oblong in cross-section. (2) Raised face flange, gasket same diameter as flange. (3) Raised face flange, gasket fits inside of bolt circle.

The Use and Abuse of
INSULATED JOINTS

by Marshall E. Parker*

SINCE the essentially electrical nature of underground corrosion was recognized, the insulated joint has been a useful weapon in the hands of corrosion engineers in their battle against this process. These joints are used in lines ranging in size from ¼-in. tubing to the largest sizes of line pipe made, handling all kinds of fluids and operating under extremes of pressures.

Insulated joints are installed for three basic purposes: (1) to separate two sections of piping (or other buried structures) which, because of differences in material or environment, might act to form a galvanic cell, to the detriment of one of them; (2) to isolate one structure or set of structures on which it is desired to install a system of cathodic protection, from others which would act as parasites and increase the current demand on the system; and (3) to segregate a complex structure into units, either for convenience in the installation and maintenance of cathodic protection, or because the current demands of different portions are so different that a more economical solution may be had by separate protection systems.

*Consulting corrosion engineer, Houston.

An example of the first mentioned use, that of separating two structures in order to avoid galvanic action between them, is the insertion of an insulated coupling in a gas service line, to prevent its being attacked by an adjacent copper water line. As illustrated in Fig. 1, an electrical circuit exists by virtue of the interconnection of gas and water lines at the customer's water heater.

If the circuit (Fig. 1) is not interrupted by an insulated joint, the copper of the water line and the steel of the gas line will form a cell in which the copper will be the cathode and the steel will be the corroded anode. It should not be assumed that the installation of the insulated coupling will free the steel pipe from all corrosive attack, but it will remove the aggravated condition and leave it in the same circumstances as an isolated steel pipe would be.

A piece of steel pipe which has been buried for a number of years will be cathodic with respect to a newly buried piece of pipe of identical composition. This means that the new pipe will be the anode, if the two are connected together, and will thus be attacked at a comparatively greater rate. Small sections of pipe installed to replace badly corroded sections have been known to fail with astonishing rapidity, due solely to this cause. The use of insulating joints to forestall this attack is seldom practical (local galvanic anodes being the preferred technique) but there is another instance in which insulation is of very great value.

In gas-transmission lines particularly, it is fairly common practice to "loop" an existing line by laying a new pipe closely parallel thereto, with crossconnections at frequent intervals. This can result in the creation of a galvanic cell many miles in length, the crossconnections forming the necessary closed electrical circuit. This condition is illustrated in Fig. 2, which also shows the locations of insulated joints which will effectively arrest the current flow and hence the corrosion. Again it must be emphasized that the installation of this material will not cure all the corrosion problems, but only those which are created by the use of the new and old pipe together.

When cathodic protection was far less widespread than it is now, it was frequent practice to install insulated joints at intervals in crosscountry pipe lines to interrupt the flow of

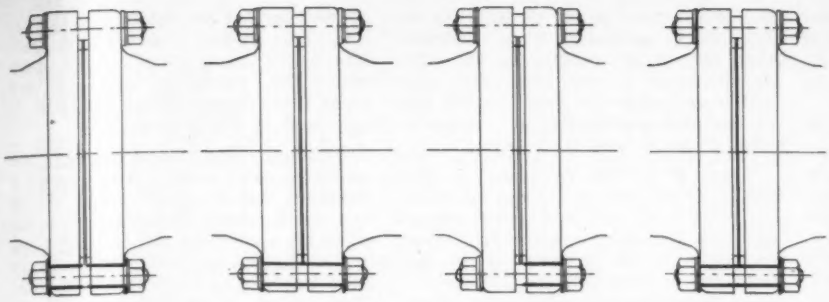

Fig. 4—Flanged joint insulation. Left to right, types A, B, C, and D.

Fig. 5—Linen-base phenolic plastic threaded coupling, shrunk and locked into cadmium-plated steel tube. (Photograph courtesy F. H. Maloney Co.)

Corrosion engineers have found the insulated joint useful in combating underground corrosion. Here are described basic purposes of such joints and details of installations in the construction of pipe lines

"long-line" currents; currents due partly to galvanic cells of very large dimensions. Such installations are less common today, because they act as impediments to the application of cathodic protection systems. The presence of such joints in a long line would, however, make possible some savings in the total current demand, when protection is applied, and would serve to block the flow of long-line currents until such time as the cathodic protection system was installed. All of this is true only if the insulated joint is located in an accessible position, and only if its presence and location is known.

Twice in the author's experience some extremely peculiar behavior on the part of a line whose protection was being attempted has been traced to the presence of an insulated joint of which no record was at hand. The usefulness of such joints in connection with cathodic protection is an example of the third function cited above, however, and will be discussed in its proper place.

The utilization of insulated joints to segregate a structure whose protection is contemplated from those whose protection is not desired is so obvious as to call for little discussion. When any type of cathodic protection device (rectifier, anodes, or the like) is connected to a buried structure, it will drain current therefrom according to its capacity.

If there exists a metallic connection with some other structure, it will drain to the connection point such current as it may pick up from the surrounding earth. If the foreign structure is bare and the designed structure is coated, for example, then the foreign structure will have a much lower resistance to earth, and will therefore collect the major portion of the current. This will result either in expending energy in protecting the wrong structure or in so overloading the source of energy that neither structure receives protection. Even if both structures are similarly coated (or bare) the condition will hold, although to a more limited extent. Therefore we insulate, to keep our equipment working on the right job.

When two or more parts of a single structure, or two or more associated structures, differ markedly in the current density needed for protection, a more economical system can be designed by isolating the different sections and treating them separately. This is the case, for example, when a coated pipe line is connected to a tank farm, with its relatively large area of steel in the tank bottoms. It is also the case when a section of bare pipe line is connected to a coated section. In either of these cases, the bare structure will "hog" all the protection, so that it will be necessary to overprotect it in order to obtain

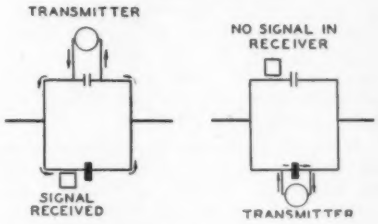

Fig. 7—Pipe locater test for shorted flanges. Left: Transmitter across insulated joint, signal received near shorted joint. Right: Transmitter across shorted joint, no signal received elsewhere on piping.

adequate potentials on the coated structure.

Seldom do two sections of similarly coated pipe differ enough by virtue of different soils in which they lie to justify insulation when cathodic protection is contemplated, although in the absence of any form of protection, the galvanic cell created by the different soils will cause corrosion that might be partly ameliorated by insulation; the trend at present is toward complete cathodic protection, however. It may also be observed that two sections of pipe, although differing considerably in the age or excellence of coating, rarely differ sufficiently in current demand to justify their separation by an insulated joint.

Types of Insulated Joints

Two main types of pipe fittings lend themselves readily to the instal-

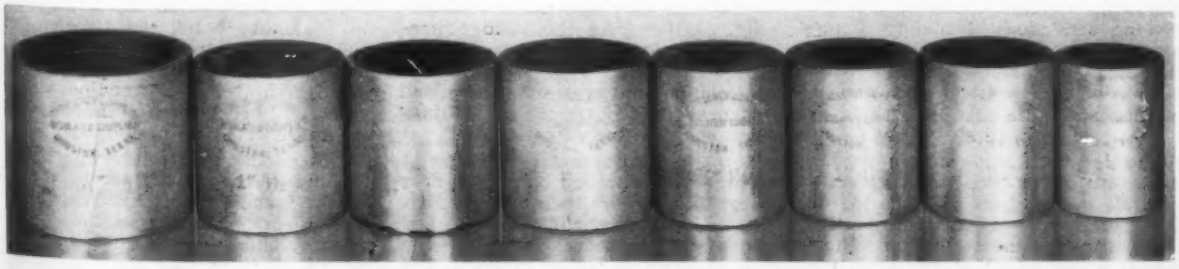

Fig. 6—Armored insulated couplings similar to the one shown in Fig. 5. (Photograph courtesy F. H. Maloney Co.)

lation of insulating joints; screwed fittings, in sizes up to 2 in. and flanged fittings, in sizes from 1 in. upward (not common smaller than 2 in.).

There are two fundamentally different type of flanged joints—those using a ring gasket in mating grooves, and those using a flat gasket. The various methods by which the flanges are attached to the piping—welded, screwed, slip-on, etc.—do not concern us here, but only the differences in the mating surfaces, where the insulation must be installed.

There are two versions of the flat gasket used with raised face flanges; one in which the gasket is the same diameter as the flanges, and has holes through which the studs pass, and one in which the diameter of the gasket is such that it fits inside the circle of studs. These two types, together with the ring-joint type, are illustrated in Fig. 3. The gasket for all three types are made of a linen-base phenolic-resin plastic, the most common thickness being ⅛ in.

A fourth variation, sometimes used where lines already in service are to be insulated, consists of merely installing the sleeves and washers comprising the stud insulation, and depending on the fiber gasket already in place to complete the insulation. No accurate records are available, but the author's experience indicates that this method is successful about four times out of five. When the expense of inconvenience of shutting down and draining lines is very great, this method is well worth trying. It has been mostly used on gathering systems and similar low pressure lines, the studs being removed and insulated one at a time—a simple enough procedure if flange alignment is good, but very difficult if the two are twisted with respect to one another, as is often the case. On high-pressure lines it is better to shut down or reduce pressure, but even then any spillage may be avoided.

With any of the above-described types of gasket, any one of a number of arrangements may be employed for insulating the flange studs. All are based on the use of sleeves surrounding the studs, and washers under the nuts. Sleeves and washers are made of the same material as insulating gaskets; the washers are customarily ⅛ in. thick, while the sleeves are either 1/32 in. thick, for use with standard studs, or 1/16 in., for use with studs of smaller diameter than standard. The four basic arrangements of sleeves and washers are shown in Fig. 4; each has its special purpose.

Type A consists of a full-length sleeve for each stud, with a washer under one of the nuts. It is customary that all the washers be installed on the same end of their respective studs, although theoretically no short circuit would result if this were not the case. This arrangement (which is the one shown in all three cases in Fig. 3) is probably more common than any of the others. Its principal disadvantage is the difficulty with which an accidental short circuit can be located, especially as compared with Types C and D.

Type B differs in using a half sleeve, long enough to pass through one of the flanges and terminate in the gap between them. This type (which can be improvised in the field by sawing off the sleeves) is very advantageous when the alignment between the two flanges is so bad as to make it difficult or impossible to insert a complete sleeve. Care must be exercised to see that the half sleeve does not slip forward enough to permit contact between nut and flange. This may be avoided by being sure that the sleeve is cut long enough —but not too long, or it will split when the nuts are drawn up tight. It may also be avoided by using a design in which the sleeve is a snug fit inside the washer, although the usual design has the inside diameters of sleeve and washer the same.

Type C differs radically from Types A and B, in that both ends of each stud are completely insulated from both flanges, and the flanges, of course, are insulated from each other by the gasket. The big advantage of this construction is that, if the joint, after being completely assembled, is found to be short-circuited, a stud-by-stud test with any continuity device will disclose the location of the defect. This and other testing techniques will be discussed more fully later.

Type D is the electrical equivalent of Type C, and differs only in that each sleeve is cut into halves. This facilitates installation in difficult locations, where the alignment is not perfect. It is obvious that both Types C and D are more expensive than either A or B, but the difference in cost is small compared to the cost of locating short circuits and remedying them; it is felt that the extra cost is fully justified in all cases of flange insulation.

Three types of screwed fittings lend themselves to insulation: nipples, couplings, and unions or swivels. The first insulation available for small threaded fittings consisted of short nipples made of a linen-base phenolic resin. In order to obtain the necessary strength, the inside bore of these nipples was made considerably smaller than the inside diameter of the corresponding size of steel pipe. This caused an undesirable constriction, and even with the added thickness thus obtained, the fittings were comparatively weak.

A major improvement consisted of an armored coupling, consisting of a threaded liner or linen-base phenolic-resin plastic, shrunk and locked into a steel cylinder. The plastic is thus relieved of tensile stresses, and is in compression only, if the piping is aligned so that no strain is on the fitting. This makes it possible to insulate small lines satisfactorily, even when the operating pressures are quite high. This type of fitting is illustrated in Figs. 5 and 6.

Although insulating couplings are available as reducers—that is, with a different size internal thread on the two ends—the present trend is toward the use of the standard coupling of the larger size, and an ordinary steel bushing to effect the reduction. This makes it possible to carry a much smaller assortment of sizes in stock, with no loss in insulating effectiveness or joint tightness.

When a gas-distribution system is to be protected, it is necessary to insulate each individual service from the main line. This is usually done at the meter. The use of either of the devices just described — nipple or coupling—involves pipe cutting and threading at each location. To install a nipple or coupling in any other system of piping already in existence involves the additional installation of a union, unless there is already one at the desired location. To simplify such installations, several varieties of insulating unions have been devised, some of which are interchangeable with standard unions, so that their installation can be effected with wrenches alone. All of these devices have the advantage of simplicity, but none so far developed seem to provide the strength and dependability of the simple armored coupling.

For the most severe service, even in the smaller sizes, a pair of insulated flanges is the most reliable and strongest type of insulated joint so far available.

Installation and Testing Techniques

The three main qualities to be sought in the installation of any type of insulated joint are proper alignment, adequate cleanliness and completeness. Plastic materials do not compare favorably with metals in tension or shear strength, but they do have relatively good compression strength. Consequently they cannot be forced or bent into position without breakage. If two mating flanges are in correct alignment, both laterally and axially, the assembled joint will not subject the plastic insulating material to any stress except compression, and a satisfactory job will be had. If, on the other hand, the flanges are twisted with respect to one another, or do not line up axially, the sleeves will be subjected to bending stress which will break them, if indeed they can be inserted without failure.

A large flat file for the studs and a round or rat-tail file for the holes will be found very useful. Their purpose is not to increase the clearances by enlarging the holes or making the studs smaller, but to remove burrs and rough spots which are

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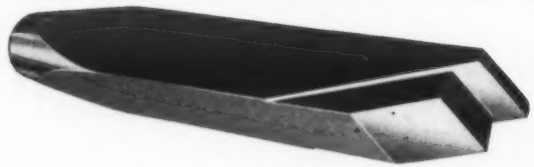

I drive 'em, in and I drive 'em out! And the men who "knock" me most are my best friends. I put up a hard front to give years of service—But I'm softer in the rear end so you can hammer away without having any chips popping off to hit you in the eye—And my overhanging upper lip keeps any pieces of the die from flying around.

TONG MEN, listen a minute . . . Haven't you had enough of trying to drive tong dies in or out with a bolt or a cold chisel, or whatever was handy? Want to stop mashing fingers, and get away from those flying chips off hardened tong dies that can put out an eye or cut your hands or face like a razor? ★ Here's how we'll do it . . . I'm "Jiffy" and I came into this world for just one reason—to work with men like you to save you a lot of grief. You'll go for me on sight, and if your tong dies are 1 inch wide I'll work for years and years for only $7.50. If you are using 1¼ inch dies, make it $10.00. ★ You won't have any trouble getting the boss to buy me when he sees how I save time and money and accidents. In fact, he'll probably get "Jiffy" Twins just in case one of us gets misplaced somewhere. Ask him the next time he's on the rig—the name is "Jiffy."

P-S-S-T . . . let me whisper to you Safety Engineers. ★ If you really knew how I cut accident rates you would personally introduce me to *every* crew on *every* rig under your eagle eye. Crews *gladly* stop using bolts, cold chisels (or what have you?) when "Jiffy" comes on the job to install and remove tong dies. I keep chips or pieces from flying off hardened tong dies to injure eyes, hands or face, and I save a lot of mashed fingers. ★ Any Web Wilson man has "Jiffy" Tong Die Drivers in his car for immediate delivery—ask him!

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lation of insulating joints; screwed fittings, in sizes up to 2 in. and flanged fittings, in sizes from 1 in. upward (not common smaller than 2 in.).

There are two fundamentally different type of flanged joints—those using a ring gasket in mating grooves, and those using a flat gasket. The various methods by which the flanges are attached to the piping—welded, screwed, slip-on, etc.—do not concern us here, but only the differences in the mating surfaces, where the insulation must be installed.

There are two versions of the flat gasket used with raised face flanges; one in which the gasket is the same diameter as the flanges, and has holes through which the studs pass, and one in which the diameter of the gasket is such that it fits inside the circle of studs. These two types, together with the ring-joint type, are illustrated in Fig. 3. The gasket for all three types are made of a linen-base phenolic-resin plastic, the most common thickness being ⅛ in.

A fourth variation, sometimes used where lines already in service are to be insulated, consists of merely installing the sleeves and washers comprising the stud insulation, and depending on the fiber gasket already in place to complete the insulation. No accurate records are available, but the author's experience indicates that this method is successful about four times out of five. When the expense of inconvenience of shutting down and draining lines is very great, this method is well worth trying. It has been mostly used on gathering systems and similar low pressure lines, the studs being removed and insulated one at a time—a simple enough procedure if flange alignment is good, but very difficult if the two are twisted with respect to one another, as is often the case. On high-pressure lines it is better to shut down or reduce pressure, but even then any spillage may be avoided.

With any of the above-described types of gasket, any one of a number of arrangements may be employed for insulating the flange studs. All are based on the use of sleeves surrounding the studs, and washers under the nuts. Sleeves and washers are made of the same material as insulating gaskets; the washers are customarily ⅛ in. thick, while the sleeves are either 1/32 in. thick, for use with standard studs, or 1/16 in., for use with studs of smaller diameter than standard. The four basic arrangements of sleeves and washers are shown in Fig. 4; each has its special purpose.

Type A consists of a full-length sleeve for each stud, with a washer under one of the nuts. It is customary that all the washers be installed on the same end of their respective studs, although theoretically no short circuit would result if this were not the case. This arrangement (which is the one shown in all three cases in Fig. 3) is probably more common than any of the others. Its principal disadvantage is the difficulty with which an accidental short circuit can be located, especially as compared with Types C and D.

Type B differs in using a half sleeve, long enough to pass through one of the flanges and terminate in the gap between them. This type (which can be improvised in the field by sawing off the sleeves) is very advantageous when the alignment between the two flanges is so bad as to make it difficult or impossible to insert a complete sleeve. Care must be exercised to see that the half sleeve does not slip forward enough to permit contact between nut and flange. This may be avoided by being sure that the sleeve is cut long enough —but not too long, or it will split when the nuts are drawn up tight. It may also be avoided by using a design in which the sleeve is a snug fit inside the washer, although the usual design has the inside diameters of sleeve and washer the same.

Type C differs radically from Types A and B, in that both ends of each stud are completely insulated from both flanges, and the flanges, of course, are insulated from each other by the gasket. The big advantage of this construction is that, if the joint, after being completely assembled, is found to be short-circuited, a stud-by-stud test with any continuity device will disclose the location of the defect. This and other testing techniques will be discussed more fully later.

Type D is the electrical equivalent of Type C, and differs only in that each sleeve is cut into halves. This facilitates installation in difficult locations, where the alignment is not perfect. It is obvious that both Types C and D are more expensive than either A or B, but the difference in cost is small compared to the cost of locating short circuits and remedying them; it is felt that the extra cost is fully justified in all cases of flange insulation.

Three types of screwed fittings lend themselves to insulation: nipples, couplings, and unions or swivels. The first insulation available for small threaded fittings consisted of short nipples made of a linen-base phenolic resin. In order to obtain the necessary strength, the inside bore of these nipples was made considerably smaller than the inside diameter of the corresponding size of steel pipe. This caused an undesirable constriction, and even with the added thickness thus obtained, the fittings were comparatively weak.

A major improvement consisted of an armored coupling, consisting of a threaded liner or linen-base phenolic-resin plastic, shrank and locked into a steel cylinder. The plastic is thus relieved of tensile stresses, and is in compression only, if the piping is aligned so that no strain is on the fitting. This makes it possible to insulate small lines satisfactorily, even when the operating pressures are quite high. This type of fitting is illustrated in Figs. 5 and 6.

Although insulating couplings are available as reducers—that is, with a different size internal thread on the two ends—the present trend is toward the use of the standard coupling of the larger size, and an ordinary steel bushing to effect the reduction. This makes it possible to carry a much smaller assortment of sizes in stock, with no loss in insulating effectiveness or joint tightness.

When a gas-distribution system is to be protected, it is necessary to insulate each individual service from the main line. This is usually done at the meter. The use of either of the devices just described — nipple or coupling—involves pipe cutting and threading at each location. To install a nipple or coupling in any other system of piping already in existence involves the additional installation of a union, unless there is already one at the desired location. To simplify such installations, several varieties of insulating unions have been devised, some of which are interchangeable with standard unions, so that their installation can be effected with wrenches alone. All of these devices have the advantage of simplicity, but none so far developed seem to provide the strength and dependability of the simple armored coupling.

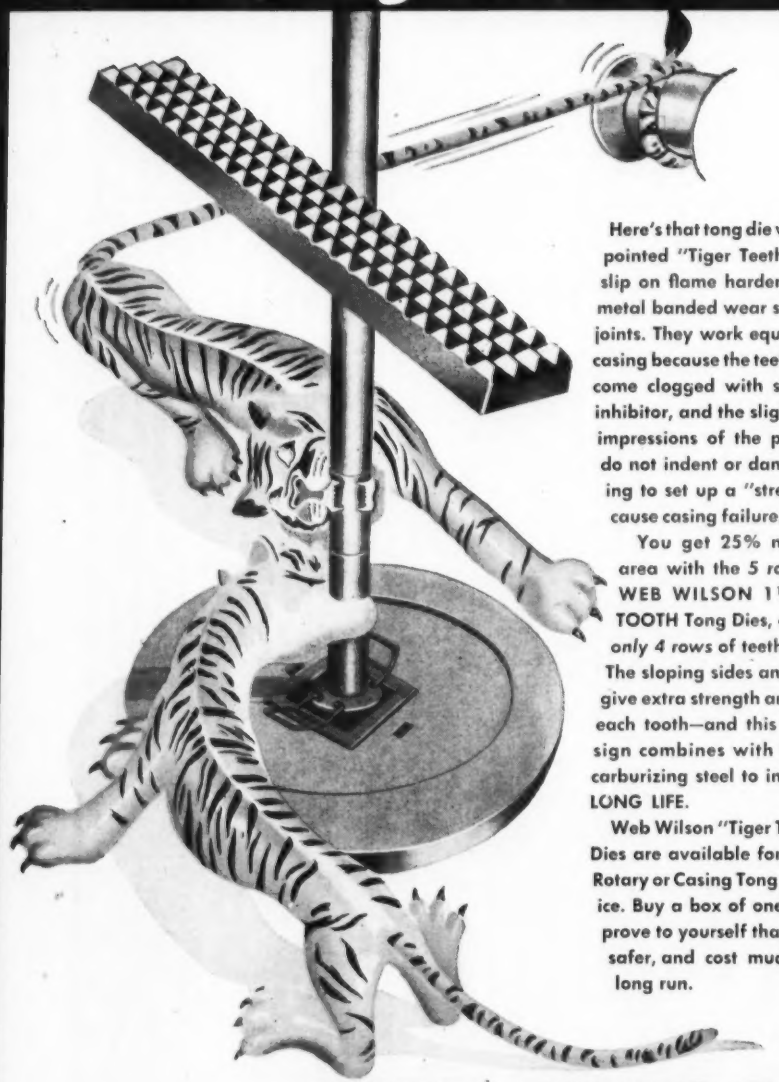
For the most severe service, even in the smaller sizes, a pair of insulated flanges is the most reliable and strongest type of insulated joint so far available.

Installation and Testing Techniques

The three main qualities to be sought in the installation of any type of insulated joint are proper alignment, adequate cleanliness and completeness. Plastic materials do not compare favorably with metals in tension or shear strength, but they do have relatively good compression strength. Consequently they cannot be forced or bent into position without breakage. If two mating flanges are in correct alignment, both laterally and axially, the assembled joint will not subject the plastic insulating material to any stress except compression, and a satisfactory job will be had. If, on the other hand, the flanges are twisted with respect to one another, or do not line up axially, the sleeves will be subjected to bending stress which will break them, if indeed they can be inserted without failure.

A large flat file for the studs and a round or rat-tail file for the holes will be found very useful. Their purpose is not to increase the clearances by enlarging the holes or making the studs smaller, but to remove burrs and rough spots which are

WEB WILSON *TigerTooth* TONG DIES



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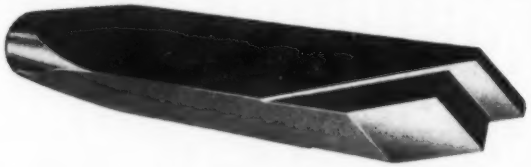

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likely to cut the sleeves, although they would not interfere with the assembly of the ordinary uninsulated joint.

Care should be taken to see that the flanges, and particularly their bolt holes, are free from grit, metal filings, or dirt, insofar as is possible. Foreign particles are particularly bad about cutting the thin sleeves or short-circuiting the insulation, and are very troublesome to locate and eliminate after the joint is assembled.

One of the most exasperating difficulties to encounter — and unfortunately not an uncommon one—is a dead short circuit caused by the simple failure to install all of the sleeves or washers in the joint. Omission of one washer will leave a current path from flange to flange so low in resistance that for all practical purposes the joint is as conductive as it was with no insulation at all. Omission of a single sleeve will also result in a short circuit of very low resistance, although sometimes the contact between the side of the stud and the side of the hole is slightly less perfect than a complete short circuit. Every precaution should be taken to insure that all of the needed material is installed in each joint.

Another frequent cause of trouble is the use of steel washers too large in diameter. Such washers will frequently contact with the edge of the spot facing or the neck of the flange, and thus nullify the insulation. Sometimes an effort is made to avoid this by filing or sawing a "flat" on the washer, to clear the obstruction; but when this is done, there is great danger that some subsequent effort to tighten the studs will rotate the washer enough to reestablish contact. Insulation ordered in sets always comes with steel washers of the proper size, with accurately flat surfaces. Too often, however, these washers are not kept segregated in the stockroom, and are used for some other purpose, so that other and less-satisfactory washers are left to go with the insulation.

As the armored coupling is simpler in detail than the flanged joint, so is its installation simpler and the necessary precautions fewer. The piping should be accurately aligned, so that no bending or tension stress is applied to the coupling. If these conditions are complied with, the plastic will not be subjected to forces other than compression, and under these circumstances it will operate satisfactorily under high pressures. One word of caution—based on an unhappy experience—may be added. The assembly should be arranged so that it will not be necessary to do any welding on the pipe close to the coupling, particularly if it is made up without a union, so that it cannot be tightened after assembly. Heat from welding expands the pipe inside the plastic, and when the joint has cooled, the shrinking metal may result in a loose joint producing a leak that cannot be corrected without complete disassembly.

As soon as an insulated joint is completely assembled, and before it is coated, wrapped, buried, or otherwise made relatively inaccessible, it should be tested to see if it does in truth insulate. This operation is not as simple as it might at first seem. If the joint, for example, separates two long sections of buried pipe line, the resistance measured across a perfect piece of insulation will be about 1.0 ohm, even if the lines have excellent coating and lie in high-resistance soil. If the lines are bare, and the soil resistivity is low, the value will be many times smaller. The resistance measured across an actual gap in bare lines may be as low as 0.001 ohm—and a gap represents perfect insulation. Any ordinary device to measure resistance, then, is quite unable to cope with the problem—unless at least one side of the joint is a very short section of pipe, or is not grounded in any way.

A test can be made under these conditions by measuring the pipe-to-soil potential on both sides of the joint, using a copper sulfate electrode and a potentiometer or high-resistance voltmeter. The position of the copper sulfate electrode should be the same for both measurements. If very different potentials are obtained—even as little as 10 or 20 mv. —then the joint is probably well insulated. If the difference is as high as 100 mv., there can be no doubt of the insulation. On the other hand, if the readings are the same on both sides, there is no absolute proof that a short circut exists, since two metallic structures in contact with the earth might happen to be at the same potential even without being connected. In this case, a storage battery or other source of electrical energy may be used with a temporary ground to drain current from one side of the joint (in effect, a temporary partial cathodic protection system) and the test repeated. If the two sides then show a difference in potential, the effectiveness of the insulation is indicated, and a further check may be made by short-circuiting the flanges with screw driver or file and noting the change in potential.

When it has been established that a given joint is shorted, the next problem is to discover and remedy the trouble. First, a careful visual inspection should be made to determine whether there are any broken or missing sleeves or washers. If the insulation is Type C or D (Fig. 4) each stud should be an electrical unit, completely isolated from both flanges. Each can be tested in turn, using an ohmmeter, or a dry cell and flashlight lamp, or any other device to indicate electrical continuity. When the offending stud or studs are located, they should be removed and reinsulated carefully, which will usually clear up the trouble.

If Type A or B insulation is employed, this method cannot be used, since all of the studs are connected to one flange, and, if one is short-circuited, all are connected to both flanges through paths which differ so little in resistance that they cannot usually be differentiated. Under these circumstances each stud should be loosened in turn, while a continuous observation of pipe-to-soil potential is made. If one side of the joint is under any degree of cathodic protection, either temporary or by a permanent system, the potentiometer connection should be at the unprotected side.

A very difficult short to locate is one in a joint which is paralleled by one or more additional joints, as in a manifold. If one of the joints is shorted, the difference between the current path through the shorted joint and the longer one is so slight that no resistance measurement will suffice to discriminate between them. The technique of loosening or removing studs one at a time may be resorted to, or, if a pipe locater of the conductive type is available, the short may be located by its use.

In using the test, the two terminals of the signal generator (transmitter unit) are connected to the two flanges of one of the joints. If this particular joint is shorted, then virtually all of the signal will pass directly through it and very little signal can be picked up by the exploring coil on other piping in the manifold. On the other hand, if this particular joint is in fact insulated, then the signal will have to go around the loop in order to complete the circuit, and the signal can be detected near the shorted joint. Fig. 7 shows the arrangement employed. Care should be taken to determine and allow for the effect produced by the direct pickup of signal from transmitter to receiver without the conduction along the pipe.

Location and Application of Insulated Joints

The principles outlined earlier will apply to the determination of which parts of a system should be segregated by insulated joints, and those in the immediately preceding section are applicable to the techniques of installation. There remains the question of the specific location and imdiately surrounding arrangements for each such joint. One of the first principles to be emphasized is that an insulated joint should be accessible. When this is the case, it can be extremely useful to the corrosion engineer in his periodic surveys of a system, whether it be under cathodic protection or not. It will also make it much easier to test the joint itself from time to time, and make any needed repairs.

It is realized, of course, that in a

great many cases no course is readily open except the installation of insulating material in existing flanges, and these may or may not be readily acessible. If such a pair of flanges is on a buried line, it is strongly advised that a box of some kind be built around the joint, so that it thereby becomes accessible. Where this is not possible, a pair of heavy (not less than No. 8) insulated wires should be attached to the two sides of the joint and brought up to some kind of junction box, or at the very least, buried just below the surface (carefully separated from one another) and identified so that electrical contact may be established with each side of the joint. This will serve all of the purposes outlined above except that of necessary repair.

If the two sides of an insulated joint are at very different potentials (as will nearly always be the case) there will clearly be a tendency for current to flow from one to the other. Since it is blocked by the insulation from taking the most direct path through the metal, it will seek the next most direct route, and flow through the soil from one section of piping to the other. Any very extensive flow of this nature will result in the active corrosion of that section of piping from which the current flows to the soil. The remedy for this undesirable state of affairs is the adequate insulation from the earth of at least a short section of pipe on both sides of the joint. It is important to coat both sides, in spite of the fact only one is subject to damage by a given direction of potential, not only because the potential might at some future time be reversed, but also because the coating of the side which would not be injured is just as effective in reducing the total leakage current and hence the total damage.

Both of the requirements listed—accessibility and protection against leakage effects—can be best served by the installation of insulated joints in relatively long runs of pipe above ground. This construction is not applicable to existing systems where the pipe is already buried, but as a principle, it should be kept in mind in the design of manifolds for new or extensively remodeled stations.

In the case of gas-gathering systems, where it is desirable to insulate the piping from the wells, the usual meter run is an ideal location for the installation of insulation. Due precautions should be taken against the accidental short-circuiting of such joints by tools, bolts, and the like carelessly placed against them; a useful type of protection against this hazard is a layer of used rubber or composition belting or gasket material, wrapped around the outside of the flanges and secured by wires or thin metal strips.

If the joint is to be buried, or is in a box subject to flooding, similar precautions should be taken against shirt-circuiting and leakage effects, by wrapping and coating the entire joint. It should be remembered that the danger of damage from leakage currents is much greater when the system on one side of the joint is placed under cathodic protection. So great is this danger, and so difficult the task of securing coatings of a high degree of perfection, that some authorities suggest that a joint under these circumstances should be bonded with a resistor adjusted so as to minimize the additional load on the cathodic protection system imposed by the structure whose protection is not sought, while at the same time a metallic path is provided for the passage of current which would otherwise tend to leak around the joint and cause corrosion.

Hazards

When the structure on one side of an insulated joint is under cathodic protection while that on the other is unprotected, the maximum potential difference across the joint is usually in the neighborhood of 1 volt. It might be supposed that this is too low a voltage to offer any particular hazard, but this is definitely not the case. The amount of current which would flow across the joint in the event of a short circuit is a much more reliable index to the hazard involved; this can range up to as high as 50 amp., and, in a few cases, even more.

The current which will flow depends upon the driving potential available and upon the total resistance of the circuit. It has already been mentioned that the total resistance may be quite small, particularly if one of the structures is bare. In one specific instance, a rectifier located about a mile from a pumping station was draining a current of about 20 amp. from a pipe line which extended 50 miles in the direction away from the station. There was, at the station, an insulated flanged joint in a scraper trap pit, installed to isolate the pipe line proper from the station piping and tanks.

The station included four large steel tanks, whose totally bare bottoms represented an extremely low resistance to earth. Connecting an ammeter across the flanges showed a flow of 25 amp. (more than the normal operating output of the unit) which is the value of current that would be interrupted if the flanges were accidentally short-circuited by the momentary contact of a wrench or other metal tool. An arc of this value is capable of igniting inflammable vapors quite readily, so it is seen that a very real hazard existed at this location, in case such an accidental contact occurred while the scraper trap was open and the pit was gassy. The danger was eliminated by boxing in the flanged joint com-

(Continued on page 77)

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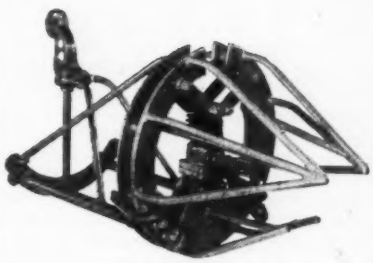
INTERNAL LINEUP CLAMPS



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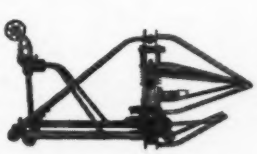

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Asphalt by Vacuum Distillation

I would appreciate receiving information regarding literature on the design and operation of vacuum refinery installations and particularly as it applies to the production of asphalts.—R. G.

Little or no significant literature exists regarding the manufacture of asphalt by vacuum distillation but some descriptions of plant design and operation are listed here. There are two major reasons for the lack of literature. First, each crude oil or charge stock yields its own quantities of asphalts of various penetrations (References 1 and 11) which can be determined only by laboratory evaluations and to some extent the properties of the asphalts from each stock are unique. Secondly, there is nothing basically different or spectacular about vacuum distillation; it is simply the practice of the conventional science of distillation as taught in all chemical-engineering schools. The second reason is nothing more than a statement that there is nothing much to say about vacuum distillation except perhaps to elaborate upon the various means of producing a vacuum (the design of vacuum ejector equipment is discussed in another Questions on Technology, now in process).

The asphalt content of crude oils is generally related to the gravity of the crude oil, the low-gravity crude oils generally containing the largest percentages of asphalt. As a general proposition, the yield of 100 penetration asphalt in low-gravity crude oils is somewhat as follows:

°A.P.I. gravity of crude oil	Per cent of 100 penetration asphalt	Asphalt fraction starts at (°F.)
13	59	850
17	48	890
20	40	910
24	30	940
27	24	950
30	17	965
36	10	975
41	6	980

Such approximations cannot, however, be considered as anything more than a generality because nearly all refiners have heard of Miranda 20.9° A.P.I. crude oil which contains very little asphalt, and the currently important Quiriquire crude oil of Venezuela contains little asphalt. Two extremes of Quiriquire oil contain less than the following percentages of 100 penetration asphalt:

°A.P.I. gravity	Per cent asphalt
17.6	30
19.9	27

These crude oils contain substantially no gasoline, a large percentage of middle-boiling-range cracking stock, and relatively little asphalt or material boils above 1,000° F.

With respect to the design of vacuum plants, pages 108, 121, 207, 233-238, 439, 468, 503, and 514-519 of the third edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., Inc., 1949) provide bits of information that pertain particularly to vacuum plants. The three articles by C. T. Chave (Reference 6) are perhaps the best articles on design but even they are not really complete.

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Liquefaction Temperatures Of Gases

In the liquefaction of gases, is there an easy means of determining if a gas below its critical temperature is in the gaseous or the liquid state at different pressures?—J. F. C.

Inasmuch as chemical compounds are gases above their boiling points and are liquids at lower temperatures, the question can be restated as: "Is there any easy method of estimating the vapor-pressure curve of the normally gaseous compounds (or hydrocarbons)?" This restatement does not help much because vapor pressure is the one major property that we have not been able to organize into a simple relationship, and because mixtures rather than pure gases are most usually encountered.

Of course, vapor-pressure charts or monographs of pure compounds are readily available:

1. Figs. 58 or 59, Petroleum Refinery Engineering, third edition, McGraw-Hill Book Co., Inc., New York, 1949.
2. Section 4, J. B. Maxwell, Data Book on Hydrocarbons, D. Van Nostrand Co., Inc., New York, 1950.
3. Fig. 543, Brown et al, Unit Operations, John Wiley & Sons, Inc., New York, 1950, and many other sources.

In addition, there are numerous charts, tabulations, etc., of the properties of individual hydrocarbons.

Inasmuch as gases are usually mixtures rather than pure, it is necessary to adopt complicated methods. The behavior of mixtures cannot be estimated by interpolation between the properties of the pure components. The point at which liquefaction starts to take place is called the "dew point" and this temperature may be estimated with fair accuracy for the following equation:

$$\pi = \pi y_1 + \pi y_2 + \pi y_3 + \ldots$$

$$= P_1x_1 + P_2x_2 + P_3x_3 + \ldots = \pi$$

in which π is the pressure; P_1, P_2, etc., are the vapor pressures of the several components stated in the same units of pressure; y_1, y_2, etc., are the volume percentages of the several components in the gas mixture; and x_1, x_2, etc., are the amounts (mol percentage) of the components in the first droplets of liquid mist. The equation can only be solved by a trial-and-error solution which involves inserting the known composition of the mixture as the "y" values, and then insert values of the vapor pressure "P." When the right temperature or dew point is used in looking up the values of "P," the sum of the "Px" terms on the right-hand side of the equation will be equal to the total pressure π.

At temperatures below the dew point, part of the mixture is liquid and part is vapor, until at some lower temperature known as the "bubble point," the mixture is entirely liquid. This temperature, the bubble point, can also be estimated from the equation. To determine the bubble-point temperature, insert the known composition of the mixture as the "x" values, and again select by trial and error a temperature (with its set of "P" values) that will make the summation of the terms on the left-hand side of the equation equal to the total pressure π.

At temperatures above the dew point, the mixture is a gas, at temperatures below the bubble point the mixture is a liquid, and at intermediate temperatures both gas and liquid are present. The range of temperature between the dew and bubble points is even more troublesome, requiring even more elaborate equa-

tions such as those outlined on pages 390-391 of the third edition of Petroleum Refinery Engineering.

Confusion can be avoided by computing first the dew and the bubble points because the equation cannot be solved at higher temperatures than the dew point or at lower temperatures than the bubble point.

The equation is not precise except for combinations of components that exhibit perfect behavior according to Raoult's law. With most materials it is necessary to look up equilibrium constants rather than vapor pressures.

Considering the complexity of vapor-liquid equilibrium, it is doubted that a simple method will even be developed. Of course, the relationship can be worked out once and for all if only one composition of mixture is to be handled day after day.

Finally, with respect to a gas that consists of only one chemical compound, the material will be a gas if the pressure is lower than the vapor pressure at that temperature, and it is a liquid if the pressure is greater than the vapor pressure at that temperature.

The Use and Abuse of Insulated Joints

(Continued from page 75)

pletely, so that accidental shorting was almost impossible.

Another very real danger, both to equipment and personnel, is that occasioned by lightning. When a stroke occurs close to a pipe line, a magnetic field of considerable intensity is suddenly built up and just as suddenly collapses. The pipe is a conductor traversing this field, so there may be generated in it currents of considerable magnitude, though of very short duration. The disturbance travels along the pipe as a steep-front wave, and when an insulated joint is encountered, the voltage occurring there may be sufficient to puncture the insulation. It seems unlikely that such surges have sufficient power to do a great deal of damage, but there may be a following current, either from cathodic protection systems (such as that just described) or power circuit earth return current, sufficient to weld metal through the punctured insulation.

The remedy is the installation of simple lightning arresters at each joint, as described by a recent article[1]. These arresters may themselves be short-circuited by lightning surges, but periodic inspection and testing enable the maintenance crew to keep them in good operating order.

The same currents which can do the damage cited above can also be dangerous to personnel; the only safe procedure is care in all operations around insulated joints, so that both sides are never contacted simultaneously. It is not safe to ignore these precautions in fair weather, for the lightning stroke may be many miles from the first insulated joint, and still be capable of creating a dangerously high potential.

Reference

1. "Lightning Arresters for the Protection of Insulated Joints in Buried Pipe Lines," Stanley Kleinheksel, Petroleum Engineer, page D-87 (March 1950).

Romere Pass Field

(Continued from page 53)

Only single completions have been made in regular oil or oil-rim reservoirs. It is believed that both the 9,000 and 9,700-ft. oil reservoirs operate under a combined gas-cap and water-drive mechanism.

Crude gathering.—In order to comply with regulations of the Department of the Interior, all producing facilities are centralized. The central tank battery comprises the following:

6—1,000-bbl. oil-storage tanks.
1—1,000-bbl. fresh water storage tank.
3—High-pressure separators (1,000 psi. w.p.).*
3—Low-pressure separators (125 psi. w.p.).*
1—Horizontal 2-stage 1,000 psi. and 125 psi. separator.
1—Stripper separator for the gas vent (125 psi. w.p.).
2—Indirect heaters (1,000 w.p.).†
1—Emulsion treater (4 ft. by 28 ft.).
1—Emulsion treater (10 ft. by 28 ft.).‡
2—Oil pumps (5 by 8-in.) with engine.

*An additional unit is under construction. †Under construction. ‡Proposed.

All produced salt water is filtered and treated through a special treater system. It is pumped into a 2,300-ft. salt-water-disposal well.

Other plant facilities include a steel warehouse. A bunkhouse to house 40 men is under construction at this writing.

The crude is pumped through a 4-in. line for a distance of about 1 mile from the central tank battery to an oil-barge loading terminal located along Main Pass. From this point the crude is loaded into barges for movement to market.

Proration.—The Louisiana Department of Conservation has set a per well allowable of 274 bbl. of oil per day, based on the depth-bracket method of allocation.

The field operates under a January 1951 allowable of 4,300 bbl. per day. Pipe-line runs for the month of November 1950 totaled 113,763 bbl. or an average of 3,792 bbl. per day. Cumulative production to December 1, 1950, was 480,955 bbl. Spacing pattern employed in development of the field is 40 acres per well.

Geology

Romere Pass is a large deep-seated domal feature exhibiting a well-developed shallow graben fault pattern. Structures in this general area are known to be highly complicated faulted features. Grand Bay dome, lying to the northwest, is a deep-seated structure, while the Delta Duck dome, to the southeast, is a deep piercement-type salt dome. No dome material has been logged to date in the deeper penetrations at Romere Pass.

Oil reservoirs.—Present completions are limited to the 9,000-ft. (6 wells) and the 9,700-ft. (11 wells) Miocene reservoirs. Both sands contain gas caps and operate under a strong water drive. Reservoir data of these two producing reservoirs appear under a separate table on field statistics. An additional potential oil reservoir lies in the 6,400-ft. sand but is not exposed in any of the present completions.

Gas reservoirs.—Although no gas wells have been completed in the field, a number of gas-distillate reservoirs have been recognized from side-wall cores in 6 Romere Pass well as follows:

Depth (ft.)	Net gas pay (ft.)
7,700	46
8,700	9
9,600	4
9,700 (gas cap)	14

The deepest test in the field drilled to date is 2 North Main Pass which was drilled to a total depth of 10,858 ft. in Miocene.

SUMMARY OF WELL STATISTICS—ROMERE PASS OIL FIELD—PLAQUEMINES PARISH, LOUISIANA
(Status as of January 1, 1951)

Locations	1
Rig up	0
Drilling	1
Completing	0
Total	2

SUMMARY OF WELL COMPLETIONS
(Status as of January 1, 1951)

Oil wells	17
Gas-condensate wells	0
Dry holes	0
Total	17

Plan new work.—During January 1951 The California Co. announced locations for two new 9,900-ft. tests. Contracts have been awarded to Loffland Brothers to drill 20 Romere Pass Unit in C NE NW 23-20s-19e, and 23 Romere Pass Unit, in C SW NW 21-20s-19e.

BOOKS

SYMPOSIUM ON TURBINE OILS. Special Technical Publication No. 125. Published by American Society for Testing Materials, 1916 Race Street, Philadelphia. 56 pp. $1.50.

The four technical papers comprising this symposium should be of interest to all those concerned with turbine lubricants and the lubrication of turbines. The four authors present a review of progress made in connection with turbine lubrication, and also consider some problems of the future. The papers and discussion comprising the symposium were presented at the A.S.T.M. first Pacific area national meeting, October 1949. The authors are agreed that inhibited turbine oils have, in general, given a good account of themselves and are allowing the operation of turbines for extended periods of time with clean lubricating systems. It is noted that there is a need for better selection of inhibited turbine oils, a need for the development of a laboratory test to better determine the remaining useful life of a used inhibited turbine oil.

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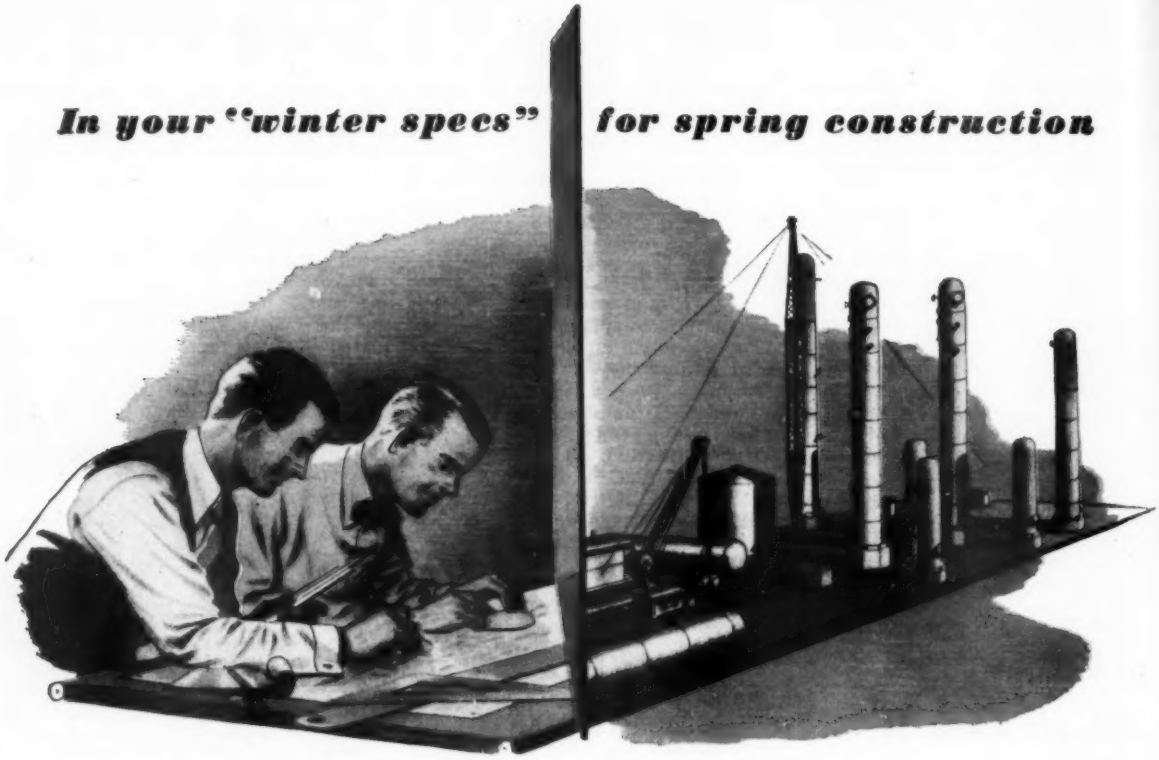

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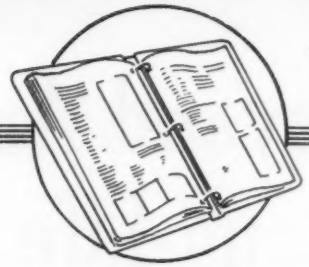


THE REFINER'S notebook

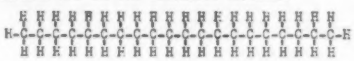
No. 57

Oils and Greases*

BEFORE we discuss the role of the petroleum oil in the grease picture, it may be helpful to review quickly the basic facts about petroleum and petroleum oils.

Chemical Structure

Crude oil, as it comes from the ground, is a mixture of vast numbers of different hydrocarbons. These are roughly separated into "fractions" having different boiling points, among these being the lubricating-oil fraction which contains the heavier, "oily" hydrocarbons. This oily fraction is further refined by various processes, and separated into numerous subfractions containing oils of different boiling points, viscosities, and other physical properties. The lubricating-oil fractions, even though they may contain fairly large percentages of ring-like structures, still have as the bulk of their makeup long, chain-like groups of molecules similar to the one pictured below that are free or attached to naphthenic rings. Most lubricating-oil molecules contain from 20 to 50 carbon atoms.



Eicosane

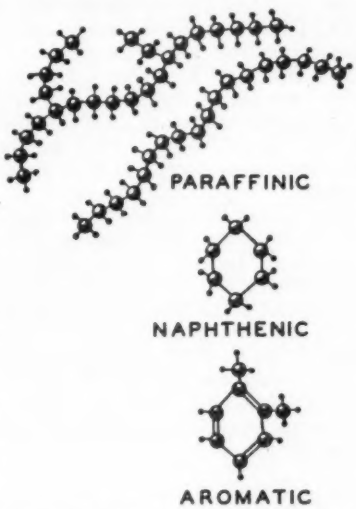
The above formula of the 20-carbon straight-chain paraffin molecule looks strangely familiar. In fact, on second look, it bears a marked resemblance to the formula of a soap molecule which appeared in the preceding installment.

Molecular Affinity

The structural similarity between the hydrocarbon molecules of the lubricating oil and the chain-like part of the soap molecule may offer the explanation for one of the puzzling phenomena exhibited by most greases—that is, the remarkable tenacity with which the soap fibers seem to hold the oil in a grease.

Comparison of the structural "pictures" of hydrocarbon oil molecules and soap molecules shows that a strong physical similarity exists. In fact, if we could magnify these molecules enough to be visible to the eye, we would find that they were identical for most of their length—looking somewhat like two "woolly worms" placed side by side.

There is much evidence that these long, chain-like molecular parts that are so much alike have some sort of definite affinity for each other. This is evidenced by the great difficulty the investigator encounters if he attempts to separate the oil and soap in a grease by mechanical means. This tendency of the oil to stick to the soap structure is usually ascribed by the grease expert to "simple capillarity" or "the sponge effect." But by whatever term this is described there still remains the fact that it appears to be due, basically, to some sort of short-range intermolecular attraction.



Petroleum oils may have widely differing properties and characteristics depending on the predominating types of hydrocarbon molecules present. Physical properties such as viscosity, viscosity index and pour point, and chemical characteristics such as oxidation stability and "compatibility" may influence strongly the behavior characteristics of a grease under certain conditions of operation.

Oil Properties

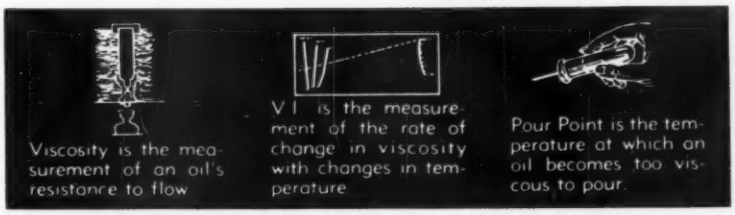
There are three important physical properties of an oil-viscosity, viscosity index, and pour point—which have a bearing on the physical characteristics of a grease.

The viscosity of an oil will affect the consistency of a grease, other factors being equal. In general, the higher the viscosity of the oil, the thicker the grease will be. However, the kind and proportion of soap used can result in the production of a thick grease from a relatively light oil, or a thin grease from a relatively heavy oil.

The viscosity index of an oil will have an effect on the rate of change in the consistency of a grease with changes in temperature, other factors being equal. But under working conditions at certain temperatures, the flow characteristics of a grease may be influenced more strongly by the type of soap used and the manufacturing methods employed.

The pour point of an oil will have an effect on the consistency of a grease at low temperatures, other factors being equal. However, because of the nature of certain soaps and the proportions used, some greases will perform satisfactorily at temperatures considerably below the pour point of the oil used in them.

The chemical composition of a petroleum oil may influence the characteristics of a grease. For example, some types of oil are not "compatible" with certain soaps, or may tend to dissolve the soap. Further, chemically unstable oils, by oxidizing, readily produce acids that affect the soap lattice unfavorably.


Viscosity is the measurement of an oil's resistance to flow
VI is the measurement of the rate of change in viscosity with changes in temperature
Pour Point is the temperature at which an oil becomes too viscous to pour.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

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TRADE LITERATURE

1 FLEXIBLE CONNECTIONS FOR OIL BURNERS. A four-page folder covers design, construction, engineers' drawings, and prices of a line of oil-burner connections. *Rasmussen Manufacturing Co.*

2 SLEEVE-PACKED BRASS COCKS shows an exploded view in addition to line drawings of six different patterns of brass cocks tested to hydraulic pressures of 1,000 psi. *Joseph Robb & Co., Ltd.*

3 AUTOMATIC CONTROLS. Catalog 700 is a 64-page listing of thermostats, oil-burner controls, temperature controls, pressure and low-water controls, transformer relays, mercury switches, magnetic and motorized valves, gas valves, and other industrial valves. *The Mercoid Corp.*

4 GACO DRUM LINING is a brochure on the characteristics of a vinyl-base drum lining that provides positive protection for drum and contents. Aging does not affect the elasticity and adhesion of this material, thus insuring protection from dents and crimps. *Gates Engineering Co.*

5 JEWEL PIPE-WELDING TOOLS. Pipe clamps, tube-turn clamps, angle clamps, flange clamps, and pipe markers for marking perfect hole and saddle on pipe are all illustrated in this 12-page booklet. Prices, specifications, layout, and erection suggestions are given. *Jewel Manufacturing Co.*

6 OIL AND GAS EQUIPMENT AND CONTROLS. Schematic drawings and operational data on back pressure and pressure-reducing regulators; floatless liquid-level controller, mechanical oil valves, and float-opening covers and trunnions are presented in Section I of a 62-page book. Section II is made up of engineering data on gas and oil capacities, dimensional specifications, assemblies, and price lists. *Kimray, Inc.*

7 WALKER-NEER SPUDDERS. Model S-32 recommended for 2,000-ft. top-to-bottom drilling and 3,000-ft. cleanout work; Model S-32 Special for 3,000-ft. top-to-bottom drilling, and 4,000-ft. cleanout work are featured in this four-page bulletin. *Walker-Neer Machine Co.*

8 MASTER LATHE CONVERTERS describes a portable, many-purpose, motorized, metal-working machine, with interchangeable heads or spindles to accomplish all types of machine-shop operations, including milling, boring, slotting, internal grinding, drilling, indexing, and keyseating. *Master Manufacturing Co.*

9 DEPENDABLE THROUGH 38 YEARS. Case histories of worm-gear-drive installations are featured in an eight-page, two-color brochure. *The Cleveland Worm & Gear Co.*

10 FIVE YEARS OF PROGRESS is a 20-page brochure on the activities of Southern Geophysical Co. relating the 5 years of growth of this company. Contents include photographs of offices of the company, key personnel, field and laboratory pictures, numerous seismic records, experience maps, and charts. *Southern Geophysical Co.*

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OIL AND GAS EQUIPMENT Digest — CHECK IT

11 IDEAL DUPLEX POWER SLUSH PUMP. The new Ideal Type C-150-B duplex power slush pump, with 7¼-in. maximum fluid cylinder liner bore, 12-in. stroke, and rated output of 160 hydraulic horsepower at 70 s.p.m. is featured in Bulletin No. 373. *National Supply Co.*

12 CATERPILLAR OFFSET D8 PIPE-LINE TRACTOR is the title of a new illustrated-specifications booklet. It gives specifications for the tractor and engine, for the Trackson MDW8 pipe layer, and for the "Caterpillar" No. 46 hydraulic control arranged for use with the pipe layer. Also included are travel speeds, lifting capacities as they vary with the overhang of the pipe layer, and details on the offset track arrangement and the No. 46 hydraulic control. *Caterpillar Tractor Co.*

13 SQUIRES STEAM SPECIALTIES. New 33-page catalog contains complete descriptive matter on steam and air traps, pressure-reducing valves, pump governors, pressure regulators, boiler-feed controls, and temperature regulators. Also such data for sizing this equipment as trap-capacity tables, reducing-valve selection charts, reducing-valve capacities, etc. *The C. E. Squires Co.*

14 EXPANSION JOINTS is a new four-page leaflet describing the four principal types of expansion joints which are produced by the company. The four principal types are a single - end, double - end, single - end with limited movement, and double-end with limited movement. Sizes range from 3-in. i.d. to 24-in. o.d. Larger sizes can be furnished upon request. *Dresser Manufacturing Division, Dresser Industries, Inc.*

15 FLEXIBLE BALL JOINTS. Basically the Barco ball joint consists of a short nipple terminating in an enlarged hemispherical section or ball which is housed inside an outer casing between two molded gaskets. This construction permits rotation as well as side flexing of the ball in any direction up to 40°. *Barco Manufacturing Co.*

16 SURFACE SAFETY VALVE. A four-page illustrated folder contains a technical article on a new, fully automatic "Type A" surface safety valve. The new valve, available in a wide variety of types for various oil and gas-line installations, combines the operating and engineering principles of Otis tubing safety valves and the "Type X" Otis surface safety valve. *Otis Pressure Control.*

17 RELAYS AND SWITCHES FOR INDUSTRIAL CONTROL. Shown and described in this 88-page book are the company's standard lines of telephone-type relays, stepping switches, and mounting facilities. Featured are class "B" general-purpose relays and two new high-speed rotary stepping switches. *Automatic Electric Co.*

18 YOUR BEST FIRE PROTECTION. A dry - chemical piped system, designed for automatic protection of industrial-fire hazards is fully explained in a new multicolor, four-page brochure. *Ansul Chemical Co.*

19 ELECTRO - CHEMOGRAPH TYPE E FOR POLAROGRAPHIC ANALYSIS. To provide information about recently announced polarographic equipment adaptable to operation from a standard 115-volt a.c. supply circuit, an illustrated, 16-page publication lists the wide applicability of the method and use of the instrument. *Leeds & Northrup Co.*

20 VALVES, FITTINGS, AND FLANGES CATALOG F-9. The 400-page catalog is full of new and improved drop-forged steel valves and fittings for every modern piping need at high or low pressures and temperatures. *Henry Vogt Machine Co.*

21 AUTOCON HI-LEVEL SAFETY SWITCH. Bulletin 7500 describes a safety switch that has no electrodes and no floats. It works on compressed air. It is extremely sensitive, is not affected by temperature, and provides an effective alarm switch that is entirely independent of other controls. *Automatic Control Co.*

22 THE ABC OF PACKAGED GENERATORS. The inside story of the "why and how" of the economical E-M packaged generators, (3.75 to 187 kva.) is given in a new 16-page, 2-color booklet. Much helpful electrical information, plus charts, graphs, and illustrations to aid in the erection and application of packaged generators are included. *Electric Machinery Manufacturing Co.*

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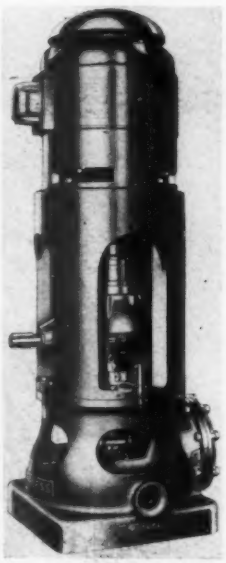
OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

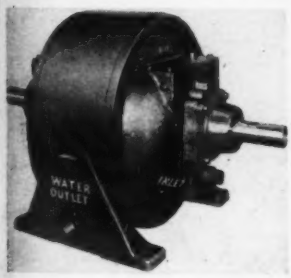
by Dan B. Miller

23 GEARTURBO PUMP HEAD. Right-angle gear drive applied to vertical rotative shaft pumps is unexcelled for applications where electricity is not available, where natural gas, gasoline, diesel, or steam power is most economical, or where the added security of standby power is desired in case of electrical power failure. Gearturbo heads are offered in nine sizes, with speed-increasing ratios of 1 to 1, 1 to 2, 2 to 3, 3 to 4, and 4 to 7 and with one speed-decreasing ratio of 11 to 10 and in horsepower ratings from 3 to 300 hp. *Peerless Pump Division, Food Machinery & Chemical Corp.*



IT'S NEW ✓ CHECK IT

24 DYNAMATIC ADJUSTABLE-SPEED WATER-COOLED COUPLING transmits rotation from a driving to a driven member without mechanical contact, with stepless adjustable control, and with almost instantaneous response. It is an effective method of providing adjustable speed from a constant-speed source with full torque starts. The addition of an eddy-current brake will provide smooth, controlled deceleration. The small amount of direct current necessary is usually obtained through a small electronic control unit fed directly by a.c. power lines. Thus an adjustable-speed drive, providing an infinite number of speed steps, is obtained entirely from alternating current. Driven machines may be directly connected to motors or other prime movers through Eddy-Current Couplings or with belts, gears, chains, or speed reducers. A standard range of sizes of Dynamatic water-cooled couplings is available for transmitting torques of 50 lb.-ft. up to approximately 5,000 lb.-ft. Many other sizes up to and including single units for handling 200,000 lb.-ft. of torque are in service and units of larger capacity can be built to order. *Dynamic Corp.*



IT'S NEW ✓ CHECK IT

25 MUDCO O-RING BUTTERFLY VALVE. This new valve is for use in salt-water-disposal systems, rotary mud systems, production, and plant operations. For highly corrosive conditions, all-aluminum-bronze valves are made in 2, 3, 4, 5, and 6-in. sizes. The lever handle is easily turned to the open or closed position, regardless of pressure. Valve, which gives leak-proof closure at 125 lb. w.p. or under vacuum, utilizes the highly efficient O-ring principle. When being closed, the valve sweeps solid materials such as shale and other foreign materials out of the way, thereby offering a greater chance of positive closure. In shop tests, the valve has been opened and closed 3,000 times under pressure from drilling mud without affecting the efficiency of the seal. Under clean water pressure, it has been opened and closed well over 8,000 times without leakage. When leakage does appear, however, the valve is renewed in the field by replacing the O-ring. *Mud Products, Inc.*

IT'S NEW ✓ CHECK IT

26 TUBE-TECTOR is a laminated drill pipe-casing rubber protector, and features greater strength and more effective gripping area due to laminated construction and especially developed oil-resistant rubber. Tube-Tectors grip the pipe with a pressure of over 1,000 psi., minimizing the possibility of movement on the pipe and reducing ring cutting and the possibility of losing protectors in the hole. Installation equipment, which is op-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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You get structural rigidity and crown block capacity comparable to that of a standard derrick... plus PORTABILITY!

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Lacing of all four sides eliminates the need for internal bracing, allowing more working room inside the derrick and unobstructed visibility. In addition, Emsco portable derricks are self-supporting and not dependent upon a gin pole. The load is distributed equally to all four legs, assuring an extra margin of safety.

Because of their design and construction, Emsco portable derricks can withstand actual wind velocities of 100 mph. on the naked structure and 75 mph. with a full setback of pipe.

For the *safest* portable derrick you can use, see your favorite supply store or Emsco representative, or write for descriptive bulletin.

EMSCO DERRICK & EQUIPMENT COMPANY

LOS ANGELES, CALIF.

Houston, Texas Garland, Texas

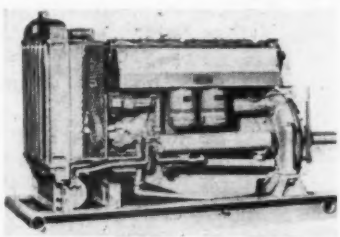
erated by specially trained Tuboscope personnel, places protectors directly on the pipe, without the use of transfer sleeves, as pipe is being run in the hole. Protectors are installed in 3 seconds on the rig floor. Tube-Tectors are also enclosed completely within the cylinder of the applicator at the time of original expansion when stressing is greatest, thus completely shielding crew members and the service operator. *Tuboscope Co.*

IT'S NEW CHECK IT

27 DISPLACEMENT METER FOR 1,000-PSI. TAKE-OFF SERVICE makes it possible for transmission companies, gas producers, and utilities to meter accurately wide ranges of delivery of gas at the takeoff point. The No. 2½ Rockwell for 1,000-psi. working pressure, weighs 950 lb., is encased in high-tensile alloy steel castings with 1¼-in. studs joining the body and cover, and boasts capacities of 31,000 and 46,000 cu. ft. per hour of gas (on a 4-oz. basis) at pressure drops of 6 and 10 in. water respectively. Its index plate carries combination drillings so that standard indexes (vertical, horizontal, or direct reading) can be oriented in either of two directions, and the meter can be fitted with a 7-day clock-driven combined gage for easy conversion of actual volumes to corrected volumes. *Rockwell Manufacturing Co.*

IT'S NEW CHECK IT

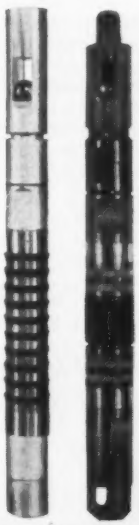
28 NEW ENGINE LINE. A new line of heavy-duty diesel engines consisting of six models from 145 to 220 hp., is designed to operate at continuous speeds up to 1,400 r.p.m. The higher operating speed will make possible the application of Murphy diesels in many new services including those requiring torque converter power transmission. Well-known design features, such as true diesel operation, unit fuel injection, four valves per cylinder, and hydraulic servo-type governor, remain as the basis of the new line. *Murphy Diesel Co.*



IT'S NEW CHECK IT

29 BARREL-FILLING METER. The new meter measures repeat quantities from 25 to 79 gal. by 1-gal. increments. Only a single gear change is necessary to obtain different quantity settings. The totalizing counter registers the total meter throughput. The reset type counter indicates the number of containers filled. To accommodate the foaming characteristics of the product, the unit's control valve is of variable deceleration in shutoff speed. This prevents "foaming over" and at the same time provides for maximum flow rate. Adjustment for different products is quickly and easily made on the slow-closing cam. An optional accessory is an automatic temperature compensator which converts readings to 60° F. The meter is also available with liter counters. Special meters to handle corrosive fluids are available upon application. *A. O. Smith Corp.*

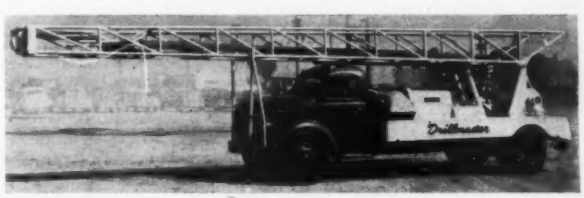
IT'S NEW CHECK IT



30 NO-FRICTION SUBSURFACE PUMP CUPS. These new cups are made from a special synthetic-rubber compound which is highly resistant to all abrasives as well as chemical attack from oil and salt-water brines. Due to the patented design their lips are free to flex with alternating loads and are highly efficient in their wiping action. Because of their increased wiping action sand does not pass them and the working-barrel tube is wiped clean on each stroke of the pump. Cups are furnished in all standard sizes and recommended for both tubing and rod-type pumps. Because of their design each size cup will operate in barrel tubes ranging in size from nominal tube diameters to plus 0.030 in. oversize. *Wilson Supply Co.*

IT'S NEW CHECK IT

31 DRILLMASTER. This new unit is exceptionally light in weight for easy portability. Designed for drilling Seismograph shot holes and test holes, the entire rig is unitized. The draw works, rotary table, mud pump, power unit, and mast are mounted on a long-wheelbase truck. A two-man crew can complete a test well or many shot holes in a single day. The mast is raised and lowered hydraulically. All the controls are located at the rear of the rig. It is made in three principal sizes and will handle core barrels up to 8 in. at 2,000 ft. *Howard-Turner Machine Works.*

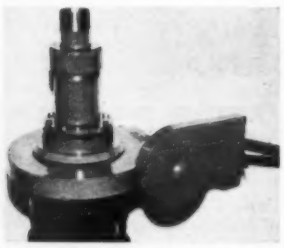


IT'S NEW CHECK IT

32 MODEL 2500 TUBING ROTATOR is designed for 80,000-lb. static load weight and the ratio is 5,600 to 1. The tubing rotator is particularly useful on crooked-hole wells where pulling and replacing of tubing results

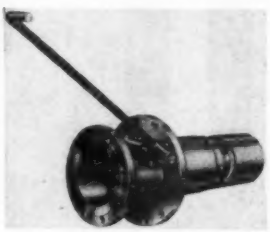
XUM

in excessive lift cost. All parts of the rotator are interchangeable. No part is welded to the tubing, making repairs easily accomplished in the field. The equipment is installed in the same manner as a conventional tubing head and installation cost is negligible. Rugged construction and simplicity of design contribute to low operating cost. By distributing sucker-rod wear equally throughout the tubing, the tubing rotator practically eliminates splits, worn couplings, and grooved tubing. *Mexia Tubing Rotator Co.*



IT'S NEW ✓ CHECK IT

33 SPRING-LOADED INTERNAL SAFETY VALVE for petroleum storage and transfer tanks has been designed primarily as a safeguard for personnel, stored product, and storage equipment should fire occur near a tank. The spring-loaded valve is opened by a manually operated lever. This lever can be locked in the open position by a cable and fusible link. When fire endangers the tank or its contents the fusible link melts, freeing the lever, and the internal spring pressure closes the valve instantly. Excess thermal expansion in the pipe line, however, will push the valve open and vent back into the tank, precluding rupture or damage to the pipe or pipe fittings. The entire valve and all its operating mechanism is contained in one unit, and fits into the tank flange so that the valve opening is inside the tank shell. *Shand & Jurs Co.*



IT'S NEW ✓ CHECK IT

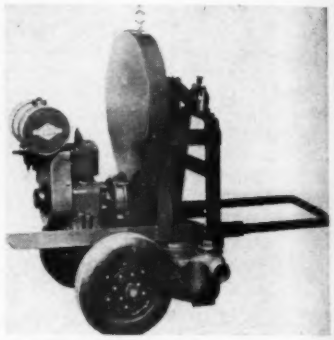
34 HEAT-REM H-170. An extra-high heat-resistant aluminum paint is capable of withstanding temperatures up to 1,700° F. The new paint utilizes a silicone base and fuses with surface metal immediately upon application. It forms a bright, elastic finish resistant to moisture, corrosion, mild acids, alkalis, and industrial fumes. It will set in 4 hours and dry completely overnight on hot surfaces. It is recommended for use on heat lines, condensers, compressors, ovens, engine heads, mufflers, radiators, exhaust manifolds, etc. It makes possible the effective painting of many types of industrial equipment which have previously been regarded as unpaintable due to temperature limitations. H-170 is intended for use as a companion product to standard Heat-Rem which is adapted to applications in the temperature range of 1,000° to 1,500° F. Heat-Rem H-170 is packaged in quart, gallon, and 5-gal. cans. *Speco, Inc.*

IT'S NEW ✓ CHECK IT

35 WA-SERIES STEAM TURBINE-GENERATOR UNITS. WA-Series steam turbine-generator units, a modern line presently developed in 500 to 7,500-kw. ratings, afford the maximum economies that can be realized with steam turbine power. WA-Series are high-speed, compact, streamlined units. Being steam-turbine-driven units, they can operate with economical regenerative feed-water heating cycles and can also be tied in theromodynamically to provide a steam-power balance where low-pressure process steam is utilized. Governor and regulating characteristics provide for paralleling with existing units and tie lines. WA-Series design incorporates the simplicity of three-bearing unit construction with quality multistage impulse turbine housing-type generator, and direct-connected exciter construction. Several features of WA-Series design include forged rotor and bucket wheel disks, chrome-steel buckets, reliable all-labyrinth-type shaft gland, and interstage packing and enclosed oil piping above foundations in both generator and turbine. *Allis-Chalmers Manufacturing Co.*

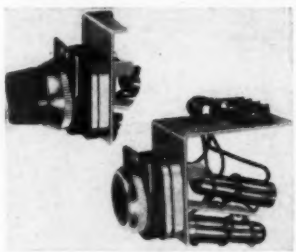
IT'S NEW ✓ CHECK IT

36 TWO NEW LIGHT-WEIGHT DIAPHRAGM PUMPS. Weighing only half as much as other Mud Hog pumps, they can be lifted on and off of trucks by two men and easily wheeled around difficult construction jobs by one man. Primarily intended for seepage control and ditch work, the lightweight Mud Hogs will lift from levels 25 ft. below the pump and handle liquids almost heavy enough to shovel. The 2-in. 202 model Mud Hog will handle up to 2,100 gal. per hour while the 3-in. Mud Hog 302 model will pump up to 3,200 gal. per hour. *Marlow Pumps.*



IT'S NEW ✓ CHECK IT

37 NEW MERCURY SAFETY SWITCH. For positive safety in hazardous, explosive locations, has either push button or selector knob. The unit consists of a hermetically sealed mercury switch mounted on a lever-operated armature. To operate the switch the selector knob is turned or the button pushed which inclines the armature thus actuating the mercury switch. There is no possibility of any spark because the actuating linkage is purely mechanical in nature. The switch is designed for vertical panel mounting and is a single-pole switch with either double or single-throw action. *Panalarm Products, Inc.*



IT'S NEW ✓ CHECK IT

38 TWO-STAR BLADE-TYPE BIT is made of a new alloy with special heat treating that gives it double the life of former models. It has met with success from the Gulf Coast to Canada and is sold at the same price of former models which were faced with hard metal. The entire bit is heat treated. Reports from geophysical and shot-hole drillers have been encouraging on this new product and it is made in all sizes from 3 3/7 to 5-in. *Varel Manufacturing Co.*

NATURAL GAS

Alford Reservoir

Big underground project planned by Texas Gas

NEW YORK.—Construction of an underground reservoir capable of storing 4 billion cubic feet of natural gas is planned by Texas Gas Transmission Corp. The reservoir will be part of the company's $939,000 underground-storage program announced last week.

Work on the new reservoir, at Alford field, near Petersburg, Ind., will begin about March 1, if the Federal Power Commission approves the project. Construction would then be completed and gas injected during the summer months.

New storage space in Alford field would enable Texas Gas to supplement its peak deliveries of natural gas by 30,000,000 cu. ft. per day, and help to meet expanding demands for natural gas in the company's Midwest service area.

Texas Gas now operates a storage field at Oaktown, Ind., capable of delivering 6,000,000 cu. ft. per day. Plans for additional storage are to be announced in the future.

Development.—To develop and utilize Alford field, the company said it must construct 12 miles of lateral line from its Indiana system, 4½ miles of storage field lines, a measuring station to record amounts of gas delivered and withdrawn from the field, and a 1,200-hp. compressor station to pump gas into or out of the field.

Texas Gas serves utilities and communities in Louisiana, Arkansas, Mississippi, Tennessee, Kentucky, Indiana, eastern Illinois, Ohio, Pennsylvania, and West Virginia. Its delivery capacity is over 700,000,000 cu. ft. per day. Plans on file with FPC call for raising capacity to 900,000,000 cu. ft. by the end of the year.

Cities Service to Expand

OKLAHOMA CITY.—Cities Service Gas Co. plans to spend $13,500,000 during 1951 for construction on its system, S. B. Irelan, president, announced. Most of the construction work will be concentrated in the Kansas sector of the tri-state Hugoton gas field and will include 700 miles of gathering lines.

Included in the program are provisions for acquiring additional gas-storage capacity in two Kansas fields near Topeka and Colony capable of storing about 20,000,000 cu. ft. of gas. This new storage will add 120,000,000 cu. ft. of gas per day to the delivery capacity of the company when fully developed.

Cities Service will install a total of 22,680 hp. in compressors.

Three of these compressors totaling 4,800 hp. will be added to the company's Ulysses, Kans., station. A new intermediate compressor station will be built near Greensburg, Kans., on the 26-in. line to Kansas City with four units totaling 6,400 hp.; two compressor stations will be constructed on the Springfield, Mo., line. One of these, 1,200 hp., will be located near Welch, Okla., and the other, 680 hp., will be near Pierce City, Mo.

Most of the pipe required to connect 650 new gas wells in the Hugoton area has been purchased, Irelan said. All of these projects will eventually increase the daily delivery capacity of the system by about 180,000,000 cu. ft.

Gas Curtailments Canceled

PITTSBURGH.—Natural-gas service to industries in this area was almost back to normal last week after a cold wave had forced gas companies to clamp on curtailments ranging from 50 to 100 per cent.

Easing of restrictions on supplies to industries was attributed to rising temperatures in the area. The cutback on gas piped to industrial firms forced several to shut down entirely. Seven finishing mills of Carnegie-Illinois Steel Corp. were down from 1 to 3 days.

Manufacturers Light & Heat Co. has restored service completely after easing its industrial curtailment to 50 per cent early last week.

Peoples Natural Gas Co. also is furnishing 100 per cent service after denying its 200 industrial users approximately 45 million cubic feet of gas due to a 50 per cent curtailment.

Equitable Gas Co., which had limited its industrial customers to maintenance gas only, also has restored full service.

November Gas Revenues Up

WASHINGTON.—Operating revenues of natural-gas companies reporting to the Federal Power Commission totaled $110,219,004 in November 1950, an increase of 24.9 per cent over the $88,277,813 reported for the same month a year ago.

Gas utility operating income for November 1950 amounted to $16,882,062, up 13.6 per cent from the $14,865,282 reported for November 1949. Net income for the month was $12,944,077 compared to $11,973,499 reported in November 1949.

Gas operating-revenue deductions amounted to $93,447,986, an increase of 27.2 per cent. Of this total, operating expenses accounted for $73,079,301, up 27.6 per cent; depreciation for $8,270,712, up 12.5 per cent and taxes for $12,097,973, up 37.2 per cent.

Transstate Gas Tax Sought

LITTLE ROCK.—Taxation of natural gas shipped through Arkansas by pipe line will be sought in a bill to be submitted to the Arkansas Legislature by Sen. James D. Johnson, of Crossett, and Rep. Glyn E. Sawyer, of Ashley County.

Objects of the measure are twofold: The bill's sponsors claim that the primary intent is to show "big industries that it would be profitable to move to Arkansas." The other purpose is to raise $1,000,000 to $5,000,000 annually for Arkansas public schools. The authors estimate that 3,000,000,000 cu. ft. of natural gas is now or soon will be flowing across Arkansas from fields of the Southwest to large industrial centers of the North and East.

The proposed bill would require companies to place meters on their lines at points at which the lines leave the state. The sponsors thought that a tax of 1 to 5 mills per M.c.f. "should not be excessive," although the amount of the tax sought has not been announced.

Nine transmission lines cross the state to transport natural gas to other areas. Texas Eastern Transmission Corp. operates one 24-in. and one 20-in. line, originally known as the Big and Little Inch lines.

Texas Gas Transmission Corp. operates three lines, one 26-in. and two 18-in. Mississippi River Fuel Corp. owns two 22-in. transstate lines; while Tennessee Gas Transmission Corp. has one 26-in. and one 24-in. line. Texas Illinois Gas Co. is now building a new 30-in. line through the state.

FPC Hearing Postponed

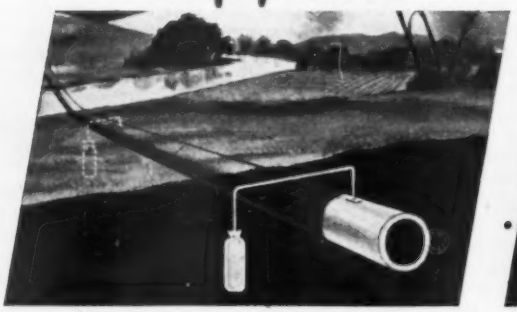
WASHINGTON.—The Federal Power Commission has postponed until May 8 the hearing previously scheduled to commence January 26 on a joint application filed by Independent Natural Gas Co., Pampa, Tex., and Northern Natural Gas Co., Omaha.

The commission said that Northern intends to withdraw the application and had requested that the hearing be postponed pending the filing of a notice of withdrawal.

Northern was proposing to acquire from Independent 21 miles of pipe line and a compressor station located in Texas. The facilities are now used by Independent to supply natural gas to Northern.

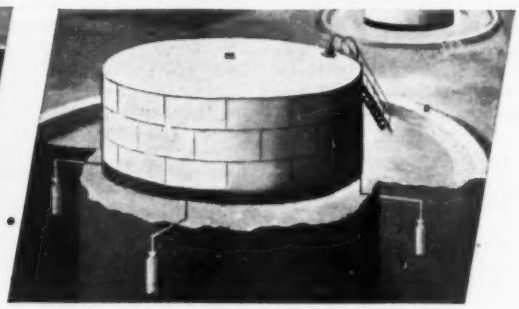
Dowell Magnesium Anodes Cut Corrosion Costs

on pipelines



Thousands of miles of buried pipelines are being protected against corrosion at low cost by Dowell magnesium anodes. Such galvanic protection is proving equally effective on coated, wrapped and bare lines.

on tank bottoms

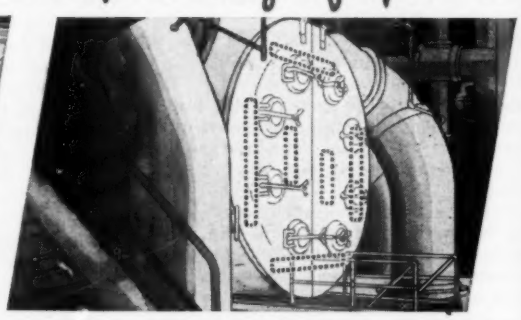


Many firms use Dowell magnesium anodes to prevent the corrosion of the bottoms of large storage tanks. This type of protection is also proving effective for oil lease tanks, gun barrels and completely buried tanks.

on sea water installations

Dowell magnesium anodes are proving satisfactory in controlling corrosion on steel piers, off-shore oil well drilling platforms, ship hulls and other underwater structures.

on operating equipment



The use of magnesium anodes to control corrosion in condensers, heat exchange equipment and many types of processing equipment is gaining wide acceptance.

Galvanic protection with high purity Dowell magnesium anodes has given industry a new way to cut corrosion costs. It has proved effective on a wide variety of installations. A system of Dowell magnesium anodes is easily and economically installed. It requires no external power and only minimum maintenance. Write to Dept. 12, Tulsa for a copy of the free 16-page booklet on galvanic protection with Dowell magnesium anodes.

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PIPE LINES

Progress Report

Crews lay 500 miles on Texas Illinois pipe line

CHICAGO.—Texas Illinois Natural Gas Pipeline Co. has laid 500 miles in the construction of its 1,400-mile system from the Gulf Coast to Joliet, Ill., according to J. J. Hedrick, president. This mileage includes 37.8 miles of 12-in., 35.2 miles of 24-in., 192.2 miles of 26-in., and 234.9 miles of 30-in. Work is progressing at compressor station sites. All engine blocks have been completed; station buildings are being erected; and foundations for houses are being constructed.

At the Arkansas River crossing near Little Rock, one of the two lines has already been pulled across. Extensive trenching is being done on both sides of the river to facilitate laying lines approximately 14 ft. below the river bed. Trenching is being done by a dredge cutting into the banks 50 ft. wide for a distance of 500 ft.

Sections complete.—H. C. Price Co. has reported construction complete on three of its four sections.

Price crews began work last September and have finished those portions of the line designated as Schedules 2, 3, and 4. These schedules comprised the laying of 109 miles of 30-in. line, 97 miles of 26-in., 35 miles of 24-in., and 32 miles of 12-in.

Schedule 2, the 97-mile section of 26-in. line, was laid from Hungerford, Tex., southward toward the La Gloria gas field. Schedule 3 included a 35-mile lateral from Hungerford to the Old Ocean field, and Schedule 4 comprised 109 miles of 30-in. from Hungerford north to the Trinity River.

Company crews still have 200 miles of 30-in. line to lay. Construction work on the line has been slowed recently due to bad weather and overhauling of equipment. Price will resume full-scale construction activity in the spring, and complete the remainder of its portion of line this fall.

Other contractors on the line are Bechtel Corp. of San Francisco, and Midwestern Constructors, Inc., Tulsa. Midwestern has been reported unofficially to have completed its section.

Illinois storage.—Studies are now being made by the engineers and executives of Texas Illinois and the companies with which it is affiliated to determine feasible means for providing storage in Illinois which would cushion the impact of winter-time peak loads on transmission operations. With adequate storage it would be practicable to operate the Texas Illinois system at a 90 per cent load factor the year around. Programs for the pipe-line systems serving the markets of Peoples Gas Light & Coke Co. call for transmitting a total of more than a billion cubic feet daily. This would include 510,000,000 cu. ft. for Natural Gas Pipeline Co. of America from Fritch, Tex., to Joliet and 524,000,000 cu. ft. for the full program planned for Texas Illinois. However, approximately 100,000,000 cu. ft. of the amount mentioned for Natural Gas Pipeline is delivered to customers along the route west of Joliet.

Of three types of storage reservoirs, the water sand type now seems to have the most promising possibilities. The other two are excavated limestone caverns and the abandoned gas fields of southern Illinois.

Explore water sands.—Water sands containing nonpotable water which are being investigated are conveniently located in northern Illinois. Several wells have been drilled already to a sand 1,600 ft. deep. Another well is to be drilled soon which will furnish data to determine sand thickness, porosity, and permeability. A water sand reservoir of the type considered might store as much as 90 billion cubic feet.

O.N.G. Plans New Line

CHICKASHA, Okla.—Oklahoma Natural Gas Co. is now spotting initial equipment and material on rights-of-way through two areas for its new 40-mile, 16-in. natural-gas pipe line from Grady County into Stephens County, Oklahoma.

The line will be constructed from the Oklahoma Natural compressor station at Farwell field, Grady County, to the Velma plant of Skelly Oil Co. in Stephens County.

Actual construction work is to begin April 1, according to O. P. Elkins, superintendent, and the company expects to lay the line at a rate of about a mile per day.

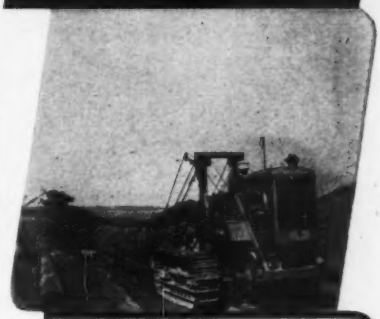
Utah Line Hearings Held

SALT LAKE CITY.—The Utah Public Service Commission has resumed hearings on the proposed construction by Utah Natural Gas Co. of a pipe line from the San Juan basin area of southeastern Utah to Salt Lake City.

The $32,000,000 line would be built from Buttes field in southeastern San Juan County to Salt Lake, a distance of approximately 360 miles.

At the initial hearing, geologists estimated reserves in the source area capable of supplying needs for at least 20 years.

CLEVELANDS



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H. C. Price Now One of Largest Line Contractors

STARTING out as pioneers in the electric welding of pipe lines a quarter century ago, H. C. Price Co. has grown into one of the world's largest pipe-line construction firms.

During these 25 years, the Price organization has participated in the construction of more than 20,000 miles of oil and gas pipe lines in 38 states, Canada, South America, and the Middle East. In addition to its tremendous pipe-line-construction program, Price operates two permanent Somastic and Hevicote pipe-coating plants. These are located at Bustleton, Pa., and at Harvey, La.

H. C. PRICE

J. B. HARSHMAN

History.—Harold C. Price, president, started in business by welding oil-fields storage tanks in the early 1920's. A graduate of the Colorado School of Mines, where he specialized in metallurgy, Price conceived the idea of electric welding line pipe in the field. Despite initial setbacks, he demonstrated to the industry's satisfaction that electric welding of pipe lines was practicable. In the years that followed, Price crews handled welding contracts on 75 per cent of all oil and gas lines throughout the United States.

At the start of World War II, the firm undertook general pipe-line construction. The Canol project in northern Canada and Alaska was constructed by a group including Price, Bechtel Corp., and Callahan interests. Price also collaborated with Bechtel and O. E. Dempsey Construction Co. in building portions of the Big Inch and the Little Big Inch for War Emergency Pipelines, Inc. Following the war the Bechtel-Dempsey-Price combine built several hundred miles of the original Tennessee Gas Transmission Co. line. As an independent contractor, Price subsequently laid important new lines for many leading oil and gas firms, including Southern Natural Gas Co., Sinclair Oil & Gas Co., Magnolia Petroleum Co., Texas-Empire Pipe Line Co., Stanolind Pipe

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Line Co. (now Service Pipe Line Co.), Great Lakes Pipe Line Co., and Natural Gas Pipeline Co. of America. In 1947 Price spreads constructed the world's first 30-in. line, the Biggest Inch, spanning the Colorado River and terminating in Los Angeles to supply natural gas to Southern California Gas Co.

During 1949 the main portion of the Toughest Inch, a 26-in. line crossing the Appalachian Mountains into Washington and Baltimore, was constructed by the Price company for Columbia Gas System, Inc.

C. R. ICE

G. A. REUTZEL

Current projects.—Price spreads recently finished a 373-mile extension to Buffalo for Tennessee Gas Transmission Co. Work on this 26-in. line was undertaken by four construction crews in May 1950, and gas was flowing through the line shortly before the New Year.

Two of the Price spreads working on the T.G.T. project were moved to southwestern Texas late last summer to start work on 480 miles of 12, 24, 26 and 30-in. line for Texas Illinois Natural Gas Co. With the 1950 sections completed for Texas Illinois, Price crews have only 200 miles of the 30-in. work remaining.

R. K. SHIVEL

W. B. WILLIAMS

Personnel.—J. B. Harshman, vice president of the pipe line division, and J. S. Dewar, vice president of the Somastic Division, are top men under Harold C. Price. John M. Thomas is manager of the pipe-line division. Spread superintendents include C. R. Ice, G. A. Reutzel, R. K. Shivel, and W. B. Williams. The Somastic plant managers are E. Rowland English, Philadelphia, and Robert P. White, New Orleans. Other officials of the company include E. L. Gallery, secretary-treasurer; S. H. Paxson, purchasing agent; B. G. Pierce, safety director; and David J. Kerr, public-relations director.

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Among the Drilling Contractors

Normal Decline Reflected in Number of Rigs Running

The number of rotary rigs operating in the United States and western Canada on January 22 indicated a continuation of a near-normal seasonal decline for the early months of the year. Last winter the United States total dropped from a high of 2,201 rigs early in December 1949 to 1,881 on February 20, 1950.

The greatest decreases for week ended January 22 were reported for West Texas-New Mexico and Illinois-Eastern areas, each with a drop of 33 rigs. Only three districts had less rigs operating than in the year earlier period with the total for all areas, including western Canada, up 142 rigs.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 1-22-51	Change week ended 1-15-51	Change week ended 1-23-50
Gulf Coast	529	— 6	+ 27
W. Tex.-N. M.	713	—33	+ 6
Ark.-N. La.-E. Tex.	136	— 3	— 5
Oklahoma	265	—11	+ 39
Kansas-Nebraska	127	— 2	+ 21
Illinois-Eastern	43	—33	— 16
Rocky Mountains	113	— 4	+ 43
Pacific Coast	129	0	— 7
Total United States	2,055	—92	+108
Western Canada	106	—15	+ 34
Total	2,161	—107	+142

*Courtesy Hughes Tool Co. Trends in drilling activity as a whole and the Pacific Coast and Illinois-Eastern are shown by charts on pages 120 and 121.

California Contractors To Study Drilling Costs

One of the principal projects undertaken by the California Chapter of the American Association of Oilwell Drilling Contractors at its January meeting in Bakersfield is a study of drilling conditions in various California fields.

An engineering and drilling study committee, headed by A. S. Hayes of Hayes & Sprague, Los Angeles, has been formed for this purpose. It will make a compilation of all drilling data possible, including time records, hazards, and other factors having a bearing on costs.

Contractors at the meeting were cautioned by E. C. Brown, president of Brown Drilling Co., Los Angeles, to be extremely cost conscious during the year. They were advised to "live, sleep, and eat" with their costs if they expected to remain in business.

Camay Awarded Contract For Three Drilling Units

Camay Drilling Co., Los Angeles, a wholly owned subsidiary of Southern California Petroleum Corp., has been awarded another 6-month contract for three drilling units by Long Beach Oil & Development Co. Camay now has six drilling rigs operating.

Camay's activity showed a decided increase during 1950 as compared with the previous year. The firm completed 81 wells in 1950 as compared to 43 in 1949. The total foot-

Workover crew of Humble Well Service Co., Houston, on Oil Drilling, Inc.'s, 2 A. Young on the south flank of Humble field, Texas. Left to right, C. E. Woodrome, John H. Brown, J. O. Brummett, and James C. Smith.

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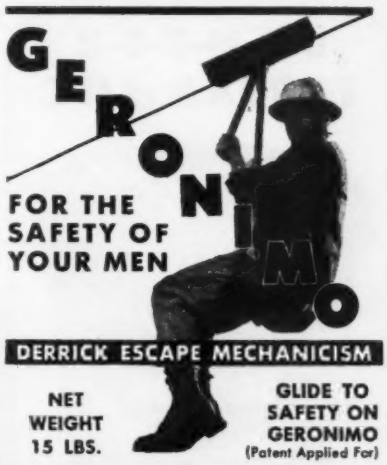

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BOX 203—HOUSTON, TEXAS

CHarter 5648

age drilled increased from 200,280 ft. to 292,256 ft. in 1950.

Dirickson-Lewis Drilling Co., Tulsa, will drill a new wildcat with its own rotary tools west of Ravendale gas pool, 5 miles south and 5 miles east of Cushing, in Lincoln County, Oklahoma. The proposed 3,400-ft. Bartlesville sand test is 1 Robinson, SE SE NW 32-17n-6e. Several dry holes have been drilled in the surrounding area, including a test drilled by Amerada Petroleum Corp. during 1948 in SE NE NW 5-16n-6e, ½ mile south of the new drill site. R. L. Kemp has an interest in the new block under test by Dirickson-Lewis.

Springer & Harper Drilling Co., Wichita, has started drilling for Drillers Production Co. at 1 Hurn, SW SW SE 28-27-5, 3½ miles west of Bartholomew pool in Kingman County, Kansas.

McCullough Drilling Co. has contracted to drill a 6,200-ft. wildcat for Rowan & Hope. Well will be 2 Irl Faver in Section 47, Block 21, T&P Survey, 5 miles east of Sweetwater, Nolan County, Texas.

Crow Drilling Co., Shreveport, is starting an 8,700-ft. wildcat test for Tip Ray and associates on the Thompson Creek prospect in Wayne County, eastern Mississippi. Location of the test, 1 Gaines-Sanderson, is in the NW NW SW 31-7n-8w.

B & R Drilling Co., Wichita, as contractor, and Wood River Oil & Refining Co., also of Wichita, are making hole at 1 Billips, SW SW NE 18-6-22, 3 miles southwest of Houston pool in Graham County, Kansas. They have an additional location 2 miles to the southwest for 1 Oliver, NW NW SW 24-6-23.

Ace Drilling Co. has contract to drill a test for T. D. Humphrey in Runnels County, West Texas. This test will go to 4,100 ft. Derrick was building for the well 7 miles southeast of Winters.

Williams-Copeland has been awarded drilling contract on the Davidor & Davidor 5 Osborn, in NE SW NE 33-9n-10e, Hughes County, Oklahoma. Test was rigging up.

James Fox, Dallas, is starting a projected 4,250-ft. wildcat test for Texas Trading at the 1 H. A. Stevens in Section 12, Davenport Survey, 13 miles east of Winters, Runnels County, Texas.

Southeastern Drilling Co., Dallas, is moving a rig to an outpost location north of the Santa Rosa field, 3 miles south of Grand Falls, Pecos County, Texas, where it will drill under contract for Greenbrier Oil Co. Location is for 1 Levy, in Section 104, Block 8, H&GN Survey.

Rainbow Drilling Co., El Dorado, Ark., has taken on two additional contracts, both with Curtis Kinard of El Dorado. One is for a 6,400-ft. Smackover lime test, 1 Clark, C NW SE 21-18s-12w, north of the Strong field, Union County, Arkansas. The other is for a 3,500-ft. Travis Peak test, 1 Betts, NE SE NE 22-17s-14w, 6 miles east of El Dorado, same county.

Zack Brooks Drilling Co., El Dorado, Ark., has contracted with the Murphy Co. for another Smackover lime well in the Catesville field, Union County, Arkansas. It will be 1 Miles, SE NW 32-18s-15w. Pay zone is expected around 8,000 ft.

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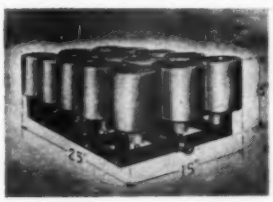

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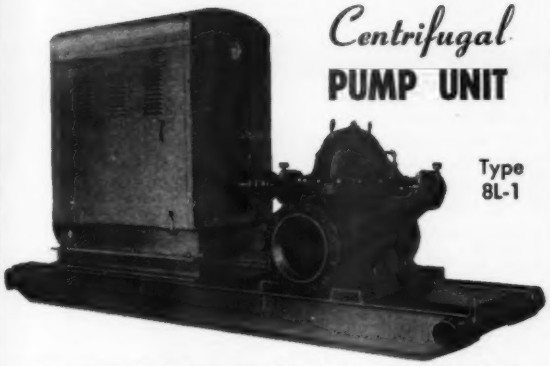

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☐ 1950—NATURAL-GAS PIPE LINES OF THE U. S.—Describes 48 major and 66 smaller gas pipe line systems in U. S. Handsome, for framing. Size is 36" by 48". Copyright Sept. 1950. Price $2.50 ea.

☐ JOURNAL GUIDE TO SCURRY COUNTY, WEST TEXAS and NEW MEXICO OIL—Shows Oil and Gas Fields, Crude & Natural Gas Pipe Lines, Refineries, & Natural Gasoline Plants. Copyright April 1950. Price $1.00 ea.

☐ JOURNAL GUIDE TO GULF COAST OIL—Exact locations Gulf Coast fields, refineries, inland water systems, other facilities. Listings by locations include cycling and natural gasoline plants. Authentic to copyright June 1950. Price $1.50 ea.

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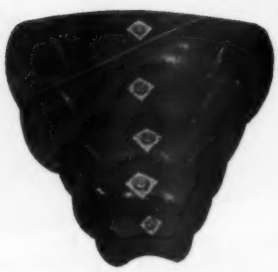

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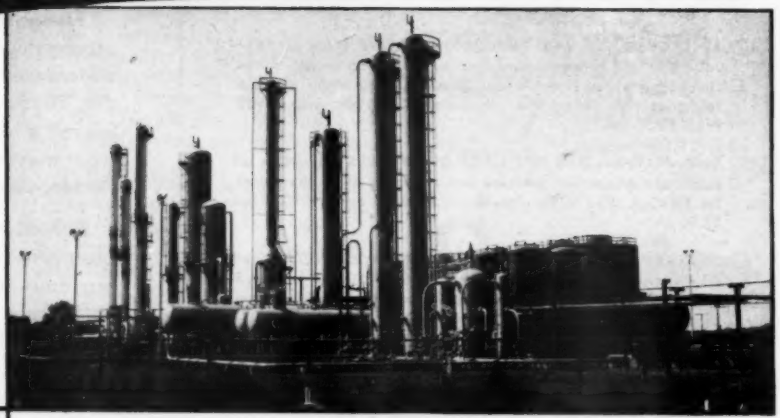

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Sohio's new $4,000,000 plant placed on stream

CLEVELAND.—A new $4,000,000 Thermofor catalytic cracking plant went on stream at the Standard Oil Co. (Ohio) No. 1 refinery here last week, adding 252,000 gal. per day of high-octane gasoline to Sohio's output. Completion of the cracker is another step in the $100,000,000 expansion and modernization program in which Ohio Standard is now engaged.

Construction details.—Construction of the unit involved the incorporation of two 9,000 bbl. per day, continuous-flow, reactor-generator units into the refinery equipment, which just 6 years ago was pronounced the "last word" in aviation-gasoline production.

Existing fractionating facilities have also been revamped and incorporated with the new 265-ft. unit which processes 50 per cent more than its predecessor. The gas plant operated in conjunction with the cracker also has been modernized and improved. New instrumentation, pumps, and exchangers are part of the modernization.

Modern design and efficiency of the new Sohio cracker will gain 10 per cent more gasoline from each barrel of crude processed than was formerly possible at the plant.

Tallest structure.—The cat is the tallest industrial structure in Ohio, and required 3,000 tons of steel piping, beams, coils, and assorted vessels in its construction. It has its own elevator to carry men and materials to various levels.

General contractor for the new unit, built on the site of the first Standard Oil refinery constructed in 1870, was Bechtel Corp. of San Francisco.

North Dakota to Get Plant

GRAND FORKS, N. D.—Standard Oil Co. of North Dakota will request bids for construction of a 2,500-bbl. refinery, it has been announced by Keith V. Bacon, secretary-treasurer for the company.

A survey of the state is now being made to determine a suitable location, and will soon be completed, he said. Several sites are under consideration, but none has been definitely chosen.

"When a person considers the fact that more than 263,000,000 gal. of gasoline—not including tractor fuel, fuel oil, and kerosine—were sold in North Dakota during 1949 and that all of it was imported into the state, it is easy to understand what an industrial asset the planned refinery will be to the people and the state," he said.

Will Add Cracking Unit

OKMULGEE, Okla.—Phillips Petroleum Co. will install a 253-ft. catalytic cracking unit at its refinery here, K. S. Adams, president, has announced. The announcement, coming after the company had considered closing the refinery for some time, ended a successful campaign staged

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment. Items—January, April, July, October.

INDEX (1946 = 100)

	1947	1948	1949	Oct. 1950
Centrifugal pumps	109.0	120.0	118.9	133.7
Reciprocating pumps	128.5	138.1	144.6	154.4
Compressor	114.0	128.0	120.0	125.9
Engines	109.0	120.0	115.6	120.5
Motors	110.0	112.7	114.0	135.3
Transformers	116.0	116.0	116.0	123.4
Instruments	113.0	120.0	122.0	133.8
Miscellaneous equipment average	114.2	122.1	121.6	132.4
Materials component	122.4	139.3	143.6	153.7
Labor component	113.5	128.0	137.1	147.1
Refinery construction index	117.0	132.5	139.7	149.7

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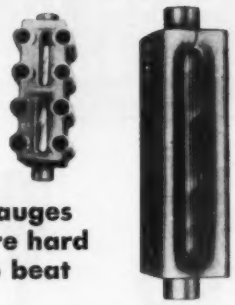

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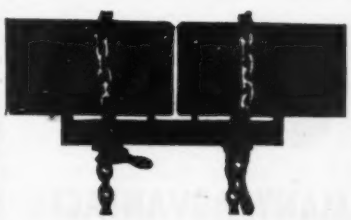

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The new cracking unit is scheduled to go into operation in May 1952, and will produce high-quality fuels. It is to be equipped with latest refining improvements, and can be adapted to manufacture of aviation gasoline.

The new plant includes a feed-preparation unit and gas plant in addition to the catalytic section. The uppermost structure of the unit will be 65 ft. taller than the present brick stack at the refinery. Permission for the tall structure will have to be solicited from the Civil Aeronautics Authority, but no trouble is anticipated by company officials due to the distance of the refinery from the airport.

Work to Begin on New Plant

EL DORADO, Ark.—Another 36,000,000 lb. annually of furnace-type carbon black will be added to the nation's rapidly expanding production when construction of the new $1,500,000 plant here is completed.

Owner and operator of the new plant, Columbian Carbon Co., has announced that construction will begin immediately.

Carbon black will be produced from byproduct oil obtained locally. This type of black is used extensively in the manufacture of tires and other rubber products.

Sinclair Gets Big Contract

NEW YORK.—Sinclair Refining Co., subsidiary of Sinclair Oil Corp., has been awarded $16,278,835 in contracts for delivery of oil products by the Armed Services Petroleum Purchasing Agency. The products include combat-grade motor gasoline, aviation gasoline, and Navy fuel oil. They are to be delivered during the first 6 months of 1951.

Combat-grade motor gasoline will be furnished from Sinclair's Houston and Corpus Christi refineries. Aviation gasoline will come from these two refineries and from the company's East Chicago and Sinclair, Wyo., refineries. Products will go solely to meet requirements of the Army, Air Force, and Navy.

Soda Ash Production Hiked

BATON ROUGE.—Production of soda ash, basic chemical material used in the manufacture of aviation gasoline, will be increased by 200,000 net tons per year, if plant-expansion plans of Solvay Process Division, Allied Chemical Dye Corp., are approved in Washington.

The contemplated expansion at Solvay's plant here would be completed within 18-24 months from the day of issuance of a necessity certificate, depending on availability of the necessary construction material.

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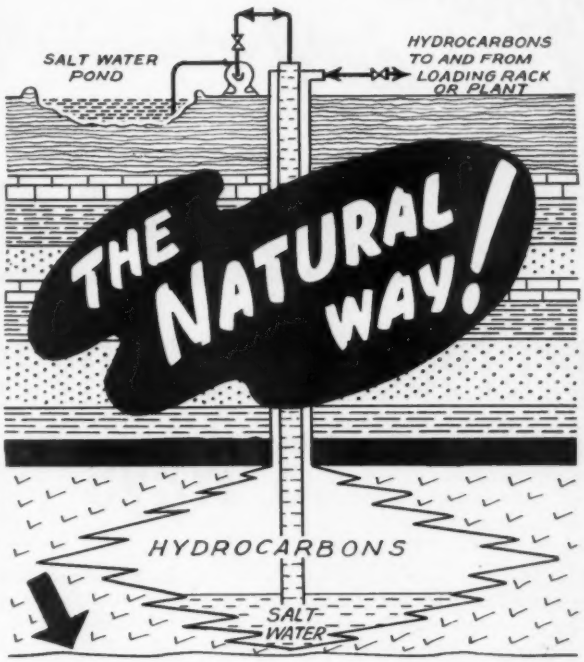

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REPORTS ON

Exploration and Drilling

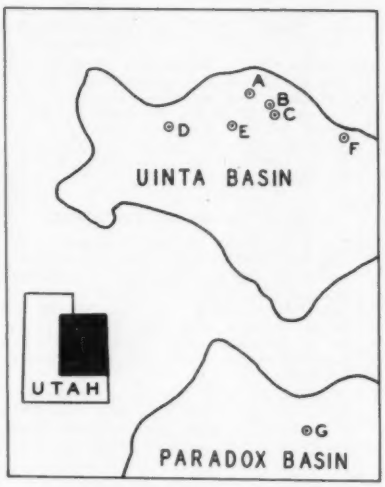
Northeastern Utah Wildcats

THE success of The California Co. 1 Red Wash Unit in Uintah County, Utah, has added more fuel to the fire of enthusiastic thinking about the oil potentialities of the Tertiary in Utah's Uinta basin.

It was only a few years ago that the Tertiary of this basin was condemned outright. It was said that the thick section contained only "dead oil" which had been washed in and deposited at the same time as the sediments which carry it. However, led by Carter Oil Co., there were some geologists who, seeing enough similarity of conditions between this area and the prolific Maracaibo basin of Venezuela, would not accept this dead-oil theory nor allow a few dry holes to discourage them. The insistence of these geologists that the Tertiary-Green River, a laminated, impure carbonate of lake origin, carried oil in commercial quanties is paying off. It is now obvious that those who see an essentially continuous oil field paralleling the northern rim of the Uinta basin are not going to be as wrong as those who condemned it.

The Uinta basin began its Tertiary-production history with Carter-Stanolind Oil & Gas Co. 1 Ute Tribal (B), the discovery well of Roosevelt pool. A confirmation well for this pool, which now appears to be a major accumulation, was completed the latter part of last year and additional "development" wells are being planned for the near future. Southeast of Roosevelt, California 1 Gusher Unit (C), completed in July 1950, found the Green River tight, but definitely "live oil" bearing. California is now drilling a well 2 miles north of the Gusher discovery and is expected to encounter a more sandy phase of the unusual reservoir formation.

California 1 Red Wash Unit (F) tested large volumes of gas at various levels between 4,166 ft. and 4,500 ft. and after a 61-minute drill-stem test at 5,249-70 ft. unloaded 4,000 ft. of 32.6°-gravity oil. Other Tertiary tests in the area are: Carter-Stanolind 1 Bluebell Unit (A), which is drilling below 11,550 ft.; Carter-Continental Oil Co. et al 1 Duchesne (E), which is drilling near 1,000 ft.; Carter 1 Burnett (D), which was recently shut down till spring at 6,727 ft.; and Carter 1 Brown (the fifth Vernal area test), about 12 miles northeast of Roosevelt pool, which is drilling near 1,500 ft.



Word from Amercol Petroleum Co.'s wildcat on Cane Creek anticline (G) is as follows: Amercol succeeded in worrying a hole down to 5,452 ft., 7 ft. into the Mississippian-Leadville, drilling with a practically saturated solution of salt water with a weight of about 82 lb. At this depth the well almost blew in before it was realized that fluid was entering the hole. The blowout preventer was closed and from a bleeder below the shut-off with the valve only cracked, the well made gas and yellow, 42.6°-gravity oil at about 1 bbl. a minute.

If this well proves to be flowing from the Leadville and not the Pennsylvanian-Paradox, which is regarded as a flash in the pan, the reports are of great significance. The core which may give the answer is still in the hole. The top of the Mississippian was called on the basis of a sharp drilling-rate change coupled with the idea that the Paradox does not have sufficient porosity for the rate of influx indicated. This basis is not enough to convince most geologists working in the area that the Paradox has been penetrated, especially in view of the fact that the Molas, which normally unconformably overlies the Leadville, was not encountered. However, a Tide Water Oil Co. wildcat on the same structure 8 miles northwest of Amercol's test, which definitely cut Mississippian rocks, was also reported not to have found the Molas. The Amercol well is now setting up a mud program and additional word from this test is eagerly awaited by Utah operators. *Philip C. Ingalls.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—A new pay for Benedum field, and second in the Permian, was reported at Blackwood & Nichols 1 Humble-Eager, located on the field's north side. Potential was 172 bbl. of low-gravity oil a day. Cities Service and Continental 1-AH University, high-gravity Ellenburger discovery, completed flowing 511 bbl. of oil in 6 hours and operators staked location for a ½-mile south offset. Also in Upton County, Sinclair 1 McElroy Ranch, indicated Pennsylvanian strike, recovered gas-cut mud in the Devonian at 10,640-10,700 ft. At that depth, it was said to be 328 ft. into the Devonian.

ROCKY MOUNTAIN AREA.—California Co. is testing an apparent Tertiary discovery in the Red Wash area, Uintah County, Utah, after the well (1 Unit) made an estimated 4,000 ft. of oil on drill-stem test. Two wells in Banner County, Nebraska, are being watched closely: Kerr-McGee Oil Industries, Inc.-Stanolind Oil & Gas Co. 1 Downer, in the Meade area, is testing after making oil from Graneros sands; British-American Oil Producing Co. is coring in that sand at the 1 Crantz, wildcat east of the Kerr-McGee-Stanolind venture.

SOUTH LOUISIANA.—New production in Beauregard Parish has been tested at Fidelity Oil & Royalty Co.'s 1 Edgewood Land & Log Co., 18-6s-9w. Drill-stem test at 8,543-58 ft. recovered 36.9°-gravity oil.

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Kansas

Clark County Wildcat Flows Viola Oil by Heads

STANOLIND OIL & GAS CO. 1 Wall, central Clark County wildcat, C NE SE 35-32-23, after treatment with an additional 4,000 gal. acid (total acid treatment 6,000 gal.) flowed by heads at an average rate of 10 bbl. of oil per hour for 9 hours. Further testing is planned for this Viola well. The intervals 6,560-66 ft. and 6,577-86 ft., above and below the present perforated interval of 6,566-76 ft., are to be perforated. This is the first important pre-Mississippian oil production of consequence ever found in the southwestern portion of Kansas.

Herndon Drilling Co.'s Scott County wildcat, 1 Reuter, NE NE NE 25-18-32, 15 miles northeast of Shallow Water pool which produces from the Mississippian-St. Genevieve, has been completed in the Lansing. This well, opener of Keystone pool, made a potential of 143 bbl. of oil per day. Amerada Petroleum Corp. 1 Chance, a southeast offset to Herndon's well, has set casing in the Lansing.

Two pool openers in eastern Kingman County were finaled this past week. Pabco Drilling Co. 1-B Viney, SW SW SW 9-28-5, was completed for a flowing potential of 121 bbl. from the Mississippian to open Dewey pool. In the SE SE SE of Section 4 of the same township, Laura Jane Oil Co. et al 1 Seward, officially opened North Landsdown pool. This discovery well, also producing from the Mississippian, had a flowing potential of 148 bbl.

Just a mile south of the Nebraska line and 4 miles north of Huffstutter pool in Phillips County, Honaker Drilling Co. 1 Gebhardt, NW NE NW 7-1-18, swabbed 6 bbl. of oil per hour after a 500-gal. acid treatment through perforations at 3,408-12 ft. in the Lansing-Kansas City. Top of the Lansing is —1,230 ft. A mile south in SE SW SW 7-1-18, Honaker set casing in the Lansing-Kansas City at its 1 Hector which topped the Lansing at —1,217 ft.

South of Sand Hills pool in northeastern Stafford County, Hexagon Oil Co. 1 Duggan, NE SW SW 30-21-11, opened Duggan pool with a potential of 470 bbl. daily from the conglomerate. Hexagon 2 Duggan, SW SW SW 30-21-11, swabbed 20 bbl. of oil per hour. Hexagon and Derby Oil Co. 1 Salem, SE NE SW 25-21-12, ½ mile west of Duggan pool, recovered only mud during two drill-stem tests of the conglomerate at 3,488-3,544 ft. and 3,490-3,590 ft.

KANSAS SUCCESSFUL WILDCATS

Barton County: National Associated Petroleum 1 Harris, NE NE SW 30-19s-12w, pumped 150 bbl. oil per day from Arbuckle at 3,394-3,400 ft., TD; anhydrite 647 ft., Heebner 3,003 ft., lime 3,118 ft., Lansing-Kansas City 3,134 ft., Sooy 3,389 ft.

Kingman County: Pabco 1 Viney "B," SW SW SW 9-28s-5w, flowed 121 bbl. oil per day from Mississippian at 3,805-11 ft., TD 3,849 ft., Lansing-Kansas City 2,970 ft., Mississippi chat 3,761 ft., Mississippi dolomite 3,786 ft.

Scott County: Herndon 1 Rueder, NE NE NE 25-18s-32w, pumped 143 bbl. oil per day from Lansing at 4,002-06 ft., TD 4,646 ft., Blaine 1,720 ft., Krider 2,835 ft., Topeka 3,688 ft., Lansing-Kansas City 3,878 ft., Mississippi lime 4,540 ft.

Stafford County: Hexagon 1 Duggan, NE SW SW 30-21s-11w, pumped 470 bbl. oil per day from conglomerate at 3,479-85 ft. and 3,489-95 ft., TD 3,578 ft., anhydrite 426 ft., Heebner 3,044 ft., lime 3,174 ft., Lansing-Kansas City 3,190 ft., Sooy 3,468 ft., Simpson 3,499 ft., Arbuckle 3,545 ft.

KANSAS WILDCAT FAILURES

Barton County: Coppinger 1 Steckel "C," CSL SE SW 33-19s-12w, dry, TD 3,395 ft., anhydrite 605 ft., lime 3,125 ft., Lansing-Kansas City 3,139 ft., Arbuckle 3,385 ft.

Westgate-Greenland 1 Janke, SE SE SE 6-18s-11w, dry, TD 3,382 ft., anhydrite 645 ft., Heebner 2,919 ft., lime 3,030 ft., Lansing-Kansas City 3,039 ft., Arbuckle 3,332 ft.

National Associated Petroleum 1 Steckel, NW NW SW 10-20s-12w, dry, TD 3,433 ft., Heebner 3,003 ft., lime 3,121 ft., Lansing-Kansas City 3,134 ft., Sooy 3,385 ft., Arbuckle 3,390 ft.

Butler County: Rex & Morris 1 Varner, SW NE SW 29-25s-4e, dry, TD 2,690 ft., Kansas City 2,095 ft., Mississippi chat 2,513 ft., Mississippi lime 2,550 ft., shale 2,607 ft., Viola 2,678 ft.

El Dorado and Cox & Burns 2 Wait, SE SW NE 21-26s-4e, dry, TD 2,819 ft., Kansas City 2,100 (?) ft., Mississippi chat 2,543 ft., Mississippi lime 2,590 ft., Kinderhook 2,670 ft., lime 2,717 ft., Viola 2,735 ft., Simpson 2,765 ft.

Morris 1 Dickinson, NW NE NW 16-26s-6e, dry, TD 2,841 ft., Lansing 1,822 ft., Kansas City 2,108 ft., Bartlesville 2,665 ft., Mississippi lime 2,771 ft.

Graham County: Barnett 1 Vesper, SE SE SW 12-9s-22w, dry, TD 3,896 ft., Heebner 3,480 ft., Dodge 3,502 ft., Lansing-Kansas City 3,520 ft., Sooy 3,843 ft., Simpson 3,888 ft., Arbuckle 3,890 ft.

Harvey County: Talbott 1 Riling, SW SW SW 18-22s-1w, dry, TD 3,365 ft., Lansing-Kansos City 2,331 (?) ft., Mississippi lime 2,947 ft., Hunton 3,328 ft.

Kingman County: Huber 1 Sisters of Charity, SW SW NW 9-28s-9w, dry, TD 4,489 ft., lime 3,411 ft., Lansing-Kansas City 3,440 ft., Mississippi lime 3,987 ft., Kinderhook 4,070 ft., Viola 4,284 ft., Simpson 4,355 ft., Simpson sand 4,374 ft., Arbuckle 4,442 ft.

Pawnee County: Tatlock 1 Flick, NE SE SE 12-21s-15w, dry, TD 3,780 ft., Heebner 3,295 ft., Douglas 3,325 ft., base Topeka 3,332 ft., Dodge 3,396 ft., Lansing-Kansas City 3,408 ft., Viola 3,671 ft., Simpson 3,714 ft., Arbuckle 3,771 ft.

Rooks County: Doley 1 Overholtzer, SW SW SE 36-9s-17w, dry, TD 3,640 ft., anhydrite 1,305 ft., Howard 2,979 ft., Heebner 3,201 ft., Toronto 3,220 ft., Lansing-Kansas City 3,240 ft., Sooy 3,537 ft., Simpson 3,569 ft., Simpson dolomite 3,583 ft., Arbuckle 3,608 ft.

Russell County: Musgrove 1 Driscoll, SE SE NW 4-15s-14w, dry, TD 3,226 ft., anhydrite 763 ft., Tarkio 2,403 ft., Topeka 2,670 Heebner 2,897 ft., Toronto 2,916 ft., Lansing-Kansas City 2,959 ft., Sooy 3,206 ft., Arbuckle 3,213 ft.

Stafford County: Palmer 1 Kelly, NE NE NW 5-21s-14w, dry, TD 3,630 ft., Heebner 3,208 ft., lime 3,310 ft., Lansing-Kansas City 3,318 ft., cherty Viola 3,576 ft., Simpson 3,586 ft., Arbuckle 3,617 ft.

Lindas 1 Sutor, SE SE SE 4-24s-14w, dry, TD 4,300 ft., anhydrite 890 ft., Heebner 3,476 ft., lime 3,616 ft., Lansing-Kansas City 3,637 ft., Sooy 3,987 ft., Viola 3,999 ft., Arbuckle 4,225 ft.

EASTERN NEBRASKA WILDCAT FAILURES

Franklin County: Bay 1 Malik, NE NE NE 17-1n-15w, dry, TD 4,132 ft., Topeka 2,926 ft., Heebner 3,132 ft., Lansing-Kansas City 3,179 ft., Maquoketa 3,711 ft., Viola 3,820 ft., Simpson 4,004 ft., Arbuckle 4,094 ft.

Richardson County: Brown-Tomer 1 Culley, SW SW NW 21-2n-16e, dry, TD 2,430 ft., Mississippi lime 2,038 (?) ft., Hunton 2,413 ft., no shows.

Kitrell 1 Fleskoski, SW SW SE 29-2n-16e, dry, TD 2,573 ft., Hunton 2,557 ft., no shows.

Rube Goldberg Views the News for His Latest Invention

HOW TO THREAD A NEEDLE

TRUMAN'S TAX DEMANDS **(A)** CAUSE **JACK BENNY (B)** TO BLOW HIS TOP—TOUPEE **(C)** FLIES OFF AND **JUDY HOLLIDAY (D)**, THINKING IT IS BUTTERFLY, MISSES WITH NET AND CATCHES MIDGET **(E)**—MIDGET'S WIFE **(F)** RUNS TO RESCUE, CAUSING **STONE OF SCONE (G)** TO UPSET SIGN **(H)**, PUTTING **JACK DEMPSEY (I)** IN REAL ESTATE BUSINESS AND GIVING "GO" SIGNAL **(J)** TO **CHARLES E. WILSON (K)**, WHO GRINDS OUT WAR PRODUCTION, SQUEEZING OUT ACID **(L)**, WHICH RELEASES TRAPEZE **(M)** FOR **BETTY HUTTON'S (N)** CIRCUS REHEARSAL—TRAINED FLEA **(O)** THINKS CIRCUS SEASON HAS OPENED AND LEAPS THROUGH HOLE IN NEEDLE **(P)**, CARRYING THREAD WITH HIM.

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"An Improvement Over Anything I've Seen Yet"

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THE PERFORMANCE OF WALKER-NEER SPUDDERS
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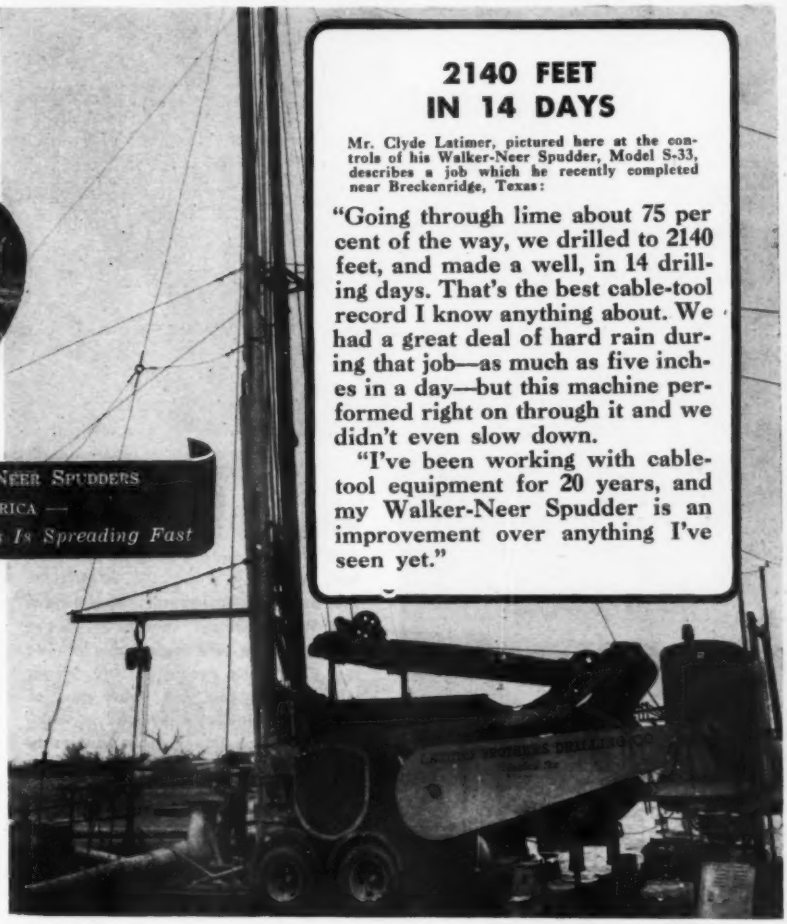
The demand for Walker-Neer Spudders is growing at a rapid rate. These units are now operating in most of the major oil fields of the United States, as well as in Mexico and Canada, under the ownership of major oil companies, independent operators, and drilling contractors—and the appraisal offered above by Mr. Latimer, rating Walker-Neer Spudders as superior to any spudder previously known, is typical of reports received.



2140 FEET IN 14 DAYS

Mr. Clyde Latimer, pictured here at the controls of his Walker-Neer Spudder, Model S-33, describes a job which he recently completed near Breckenridge, Texas:

"Going through lime about 75 per cent of the way, we drilled to 2140 feet, and made a well, in 14 drilling days. That's the best cable-tool record I know anything about. We had a great deal of hard rain during that job—as much as five inches in a day—but this machine performed right on through it and we didn't even slow down.

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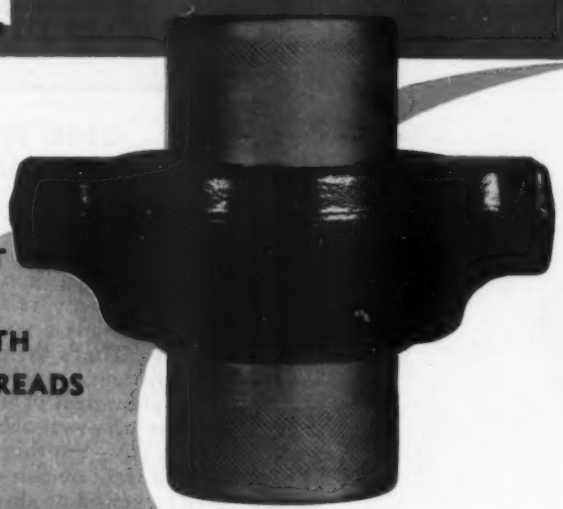

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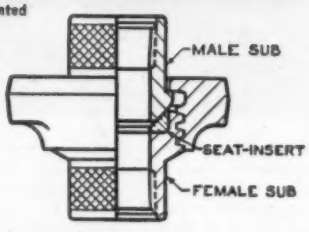

The replaceable bronze seat insert in the female sub assures a surface unimpaired by rust on lines involving condensation.

Many operators have standardized on Weco Fig. 600 because the replaceable bronze seat prolongs its use far beyond the normal service life of ordinary unions . . . because it is available in sizes 1" through 4" with all parts interchangeable . . . because it is ideal for BOILER HOOK-UPS — BLOWOUT PREVENTER LINES—MUD LINES—STAND PIPE CONNECTIONS — BOILER HEADERS—HIGH PRESSURE SEPARATOR LINES.

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Appalachian Field

Several Good Gassers Completed in Pennsylvania

PITTSBURGH.—In North-Central Pennsylvania, Leidy Township, Clinton County, Keta Gas & Oil Co. completed 1 Charles Cross, elevation 900 ft., for 10,800,000 cu. ft. of gas. Rock pressure was 3,180 psi. in 24 hours. Tops were: Onondaga lime, 5,622 ft., Oriskany sand, 5,650 ft. Gas was found at 5,651 ft. Total depth is 5,651 ft. Leidy Prospecting Co. 3 Calhoun Estate, elevation 1,126 ft., was completed, testing 10,000,000 cu. ft. of gas, with rock pressure 3,180 psi. in 24 hours. Tops were Onondaga lime, 5,797 ft., Oriskany sand, 5,823 ft. Gas was found at 5,824 ft. Total depth was 5,824 ft. Noyly Development Co. completed 1 Fred Pelkey, elevation 867 ft., for 6,300,000 cu. ft. of gas. Rock pressure was 2,600 psi. in 24 hours. Tops were: Onondaga lime, 5,583 ft., and Oriskany sand 5,607 ft. Gas was found at 5,608 ft. Total depth was 5,612.

New York State Natural Gas Corp. has located N-213 Geo. Cross. The completed wells and the new location are on the Hammersley Fork Quadrangle. C. E. Fraelich has located 1 Lester Brown and Godfrey L. Cabot, Inc., has located 1 Alonza Mahon, both in Wharton Township of Potter County. Wood Rock Oil & Gas Co. has located 1 Johnson in Cameron County.

No important results were noted in Southwest Pennsylvania. Two new locations were reported in Red Bank and Wayne townships of Armstrong County.

In Garrett County, Maryland, Eberly & Snee 1 Camp Meeting Holiness Association, elevation 2,479 ft., was completed at 3,674 ft. with gas testing 11,885,000 cu. ft. in the chert, as previously reported. Columbian Carbon Co. 1-GW-1503 Oren T. Graser, elevation 2,384 ft., had a final gage of 249,000 cu. ft. of gas, after shot. Chert was topped at 2,967 ft., Oriskany sand at 3,094 ft., and gas was found in this formation at a total depth of 3,601 ft. George L. Yaste 1 Grimes, elevation 2,421 ft., recorded the Onondaga lime at 3,358 ft.

In Portland district, Preston County, West Virginia, Hope Natural Gas Co. 9462 Margaret C. Kraus, elevation 2,012 ft., was completed, gaging 12,500,000 cu. ft. of gas, natural, in Oriskany sand, as previously reported. Total depth is 5,101 ft. Eberly & Snee 1 J. Paul Martin, elevation 2,024 ft., tested 127,000 cu. ft. of gas, after shot. Second chert was topped at 5,235 ft. Gas was found at 5,268-5,341 ft., Oriskany sand was topped at 5,377-5,505 ft., and gas was found at 5,385, 5,408 and 5,497 ft. Total depth is 5,689 ft. Two good shallow-sand gas wells were noted. In Otter district, Braxton County, Alberta Run Gas Co. 1 Luther J. Smith tested 1,660,000 cu. ft. of gas from Salt sand at a total depth of 1,573 ft. In Oceana district, Wyoming County, Hope Natural Gas Co. 9446 Loup Creek Colliery Co. tested 1,077,000 cu. ft. of gas, after shot, from brown shale at a total depth of 3,877 ft.

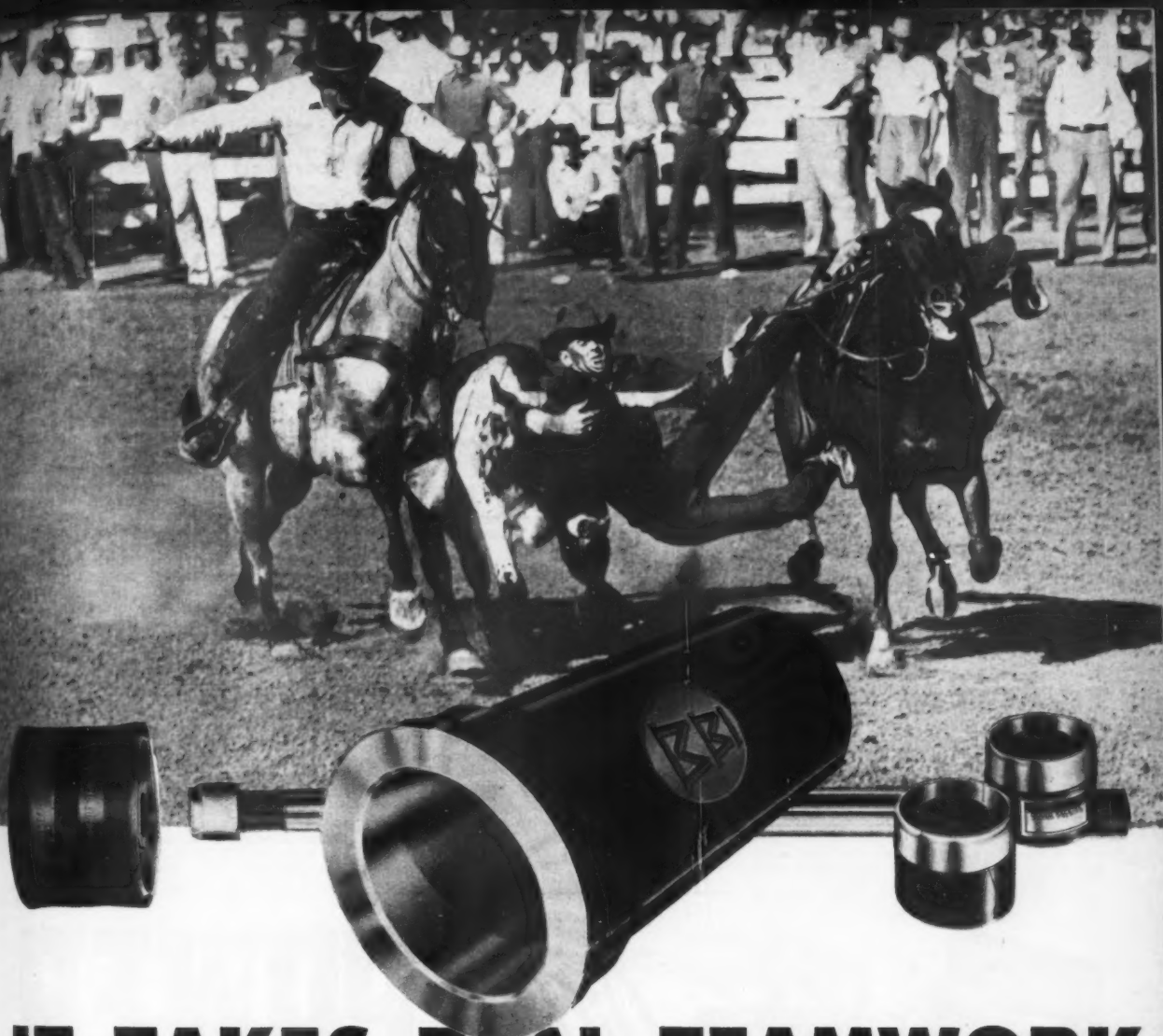
Seven new locations in West Virginia were reported: Union district, Clay County; Ravenswood district, Jackson County; Court House district, Lewis County; Buffalo and Union district, Putnam County; Union district, Tyler County; and Grant district, Wayne County.

MARYLAND SUCCESSFUL WILDCATS

Garrett County—Eberly & Snee 1 Camp Meeting Holiness Association, elevation 2,479 ft., 11,885,000 cu. ft. of gas; chert 3,645 ft.; gas 3,657-3,674 ft., TD 3,674 ft. Columbian Carbon Co. 1-GW-1503 Oren T. Grasser, elevation 2,384 ft., 249,000 cu. ft. of gas, after shot; chert 2,967 ft., Oriskany sand, 3,094 ft., gas in Oriskany, TD 3,601 ft.

WEST VIRGINIA SUCCESSFUL WILDCATS

Preston County, Portland district: Hope Natural Gas Co. 9462 Margaret C. Kraus, elevation 2,012 ft., 12,500,000 cu. ft. of



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Mission Silver Top Valve for Normal Pressures

Mission Super-Service Valve for High Pressures

gas, natural; Oriskany sand, 5,087 ft.; gas, 5,090-5,101 ft.; TD 5,101 ft.

Eberly & Snee 1 J. Paul Martin, elevation 2,024 ft., 127,000 cu. ft. of gas, after shot; second chert, 5,235 ft.; gas, 5,268-5,341 ft.; Oriskany sand, 5,377-5,505 ft.; gas, 5,385, 5,408 and 5,497 ft.; TD 5,689 ft.

Southwest Texas

Completion Made on New Atascosa County Discovery

CORPUS CHRISTI.—Final completion has been made on Atascosa County's new Edwards lime discovery, Lone Star Production Co. 1 Sarah E. Ferry, I&GN Survey, Section 1,699. Through perforations at 8,206-30 ft., the well flowed 128 bbl. of 33°-gravity oil daily after being treated with 1,300 gal. of acid. Well is bottomed at 8,280 ft. and has 5½-in. production string set at 8,279 ft. Electric-log information included the following tops: Eagleford 7,750 ft., Buda 7,810 ft., Del Rio 7,920 ft., Georgetown 7,971 ft., Edwards lime 8,100 ft.

A rank wildcat has been staked in Dimmitt County as Howeth & Mason 1 George Light, I&GN RR Survey, Block A, Abstract 529, 8 miles east of Catarina. The well will be drilled to 6,000 ft. in the Navarro, and is scheduled to be spudded between February 15 and March 1.

The Texas Co. is drilling below 10,850 ft. in shale at 1 El Texano Land Co., a 13,000-ft. wildcat being drilled approximately 6 miles south-southwest of McAllen field in Hidalgo County. It is located in Juan Antonio Villareal Porcion 64, Abstract 41, ½ mile south of Hidalgo.

In Kenedy County, Humble Oil & Refining Co. is drilling below 8,050 ft. in sand and shale after running drill-stem test in E-1 Kenedy, Jr., wildcat in El Paistle Grant. No details are known of the drill-stem run from 7,970-85 ft. A previous drill-stem test run from 7,706-16 ft. recovered 615 ft. of salt water through 1-in. and ¼-in. chokes. Bottom-hole pressure flowing was 525 psi. and shut-in pressure 3,500 psi.

Magnolia Petroleum Co. has plugged 2 J. L. Dornak outpost at LaParita in Atascosa County, at 1,472 ft. Core from 1,296 to 1,383 ft. recovered sandy shale with lime streaks, with no show. Core from 1,383-1,472 ft. caught top of Carrizo sand at 1,422 ft., but had only slight show of oil. The well was located in Tract 7, Hagelstein's Natascosa Colony Farm Subdivision.

The 52 new locations include 10 wildcat starts, 1 each in McMullen, Milam, Wilson, and Jim Wells counties, and 2 each in Jim Hogg, Nueces, and San Patricio counties. There were 3 successful exploratory wells completed, 1 each in Atascosa, Bexar, and San Patricio counties, while 14 were dry, 1 each in Bastrop, Caldwell, Frio, Kendall, Milam, Jim Hogg, Jim Wells, and Webb counties, and 2 each in Guadalupe, Duval, and Starr counties.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: New pool, "Coughran"—Lone Star Gas Production Co. 1 Sarah E Ferry, I&GN Sur., Sec. 1,699, A-431, TD 8,280 ft., perf. Edwards lime 8,208-30 ft., IP: 128 bbl. oil per day, 3/16-in. choke, TP 490 psi., 33° gravity.

Bexar County: Oil discovery—Pegg Bros. Drilling Co. 2 Pablo Verdeja, N. Montaya Sur., A-21, 10 mi. SE of San Antonio, TD 853 ft., open hole 840-53 ft., IP: 2 bbl. oil per day on pump.

San Patricio County: Gas-condensate discovery—Phillips Petroleum Co. 1 Turk (State Lease 50398), John Smith Sur., A-234, TD 9,644 ft., perf. 9,480-90 ft. and 9,520-50 ft., IP: 72 bbl. condensate per day plus 2,400,000 cu. ft. of gas, TP 3,600 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bastrop County: August Kothman 1 T. Bennett, Elizabeth Standifer Sur., 2 mi. SW of Elgin, dry, TD 2,273 ft.

Caldwell County: Newton & Feland 1 Theo Kreuz, et al, W. M. Barnett Sur., 6 mi. N of Luling, dry, TD 2,566 ft.

Duval County: Argo Oil Corp. 1 Mrs. Lennie Ray, et al, Spring Creek Irrig. Co. Sur. 19; A-750, 13 mi. N of San Diego, dry, TD 5,210 ft.

Gorman-Daubert-Achning 1 Yates Ranch, Rosa G. Gray Sur. 358, A-1093, 10 mi. NE of Freer, dry, TD 3,475 ft.

Frio County: Lewis Oil Co. and C. C. Dauchy 1 Marrs McLean Tr., John Martin Sur. 966, A-516, dry, TD 6,000 ft.

Guadalupe County: W. M. Bradshaw, et al, 1 Montgomery Merriwether, Robert Smith Sur., 5½ mi. NE of Kingsbury, dry, TD 2,230 ft.

Riddle Oil Co. 1 G. W. Blanks, E. Cortari Sur., 3½ mi. SW of Seguin, dry, TD 1,940 ft.

Jim Hogg County: Sun Oil Co. A-1 A. C. Jones, Agua Nuevea de Arriba Gr., 2 mi. S of Hebbronville, dry, TD 5,475 ft.

Jim Wells County: Appell Drilling Co. 1 George Reynolds, M. Dugan Sur. 30, A-135, 4 mi. W of Orange Grove, dry, TD 5,129 ft.

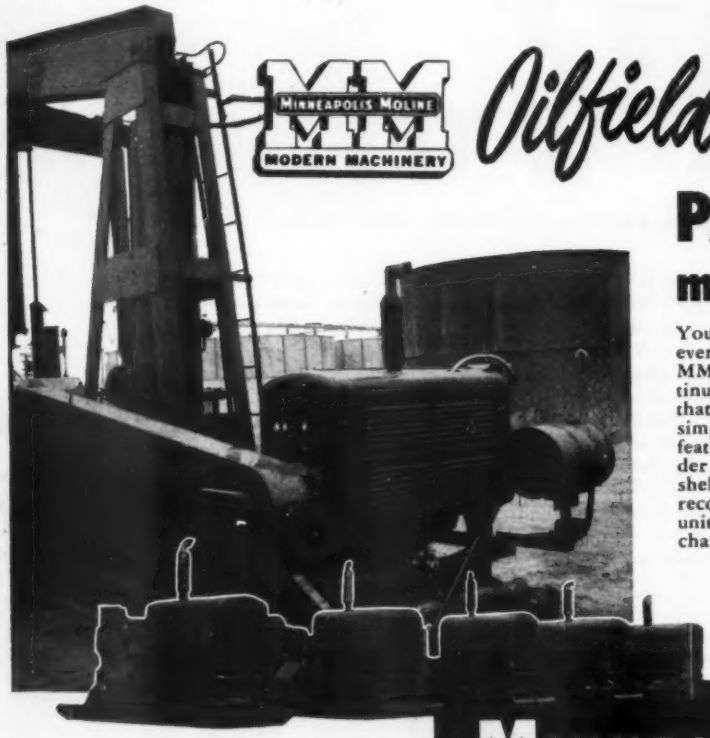
Kendall County: C. G. Newton 1 Bruno Ranzau, George Warner Sur. 10, 3½ mi. E of Sisterdale, dry, TD 1,000 ft.

Milam County: Henderson & Slayton 1 J. F. Bartek, P. S. DePena Sur., 8 mi. NE of Cameron, dry, TD 1,889 ft.

Starr County: W. H. Holland 3 Vela, Share 2-A, Porc. 94, dry, TD 2,560 ft.

Ben D. Marks, Trust, C-1 Downs Royalty Corp., Block 59, Ey Javali Gr., 25 mi. N of Rio Grande City, dry, TD 2,420 ft.

Webb County: Polis & Hagan 1 J. Russell Saunders, Will H. Hearns Sur. 108, A-3,143, dry, TD 3,832 ft.



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North Central Texas

Jack County Wildcat Flows 28 Bbl. from Conglomerate

WICHITA FALLS.—In eastern Jack County, 7 miles west of Chico, G. C. Glasscock and Pontiac Refining Co. 1-B Morris flowed 28 bbl. of 41°-gravity oil a day through 16/64-in. choke, from a conglomerate section at 5,252-64 ft. Location is over a mile north of nearest conglomerate production, which is reportedly from a different zone.

A new Simpson strike has been indicated in Clay County, 4 miles southeast of Henrietta at Stephens Petroleum Co. 1 Bryant Edwards. Top of the lime was 6,196 ft., and first oil show was drilled from 6,230-50 ft. A 1-hour test of the section had gas in 29 minutes and recovered 80 ft. of free oil plus 75 ft. of heavily oil and gas-cut mud. A core ahead to 6,260 ft. recovered 6½ ft. of additional pay and another test was under way.

A third Strawn pay zone in the Burns-Ragland field of Young County flowed oil at L. T. Burns 3 Williams, 2½ miles northeast of True. Drill-stem test from 3,172-82 ft. had gas in 5 minutes and flowing oil in 55 minutes. The well was not flowed, but recovery was about 50 bbl. of oil. Operators ran casing to 3,172 ft. for completion. Other Strawn pay sections in the area have been found around 2,900 and 3,900 ft. The new producer is almost a twin well to a Mississippian well.

In Throckmorton County, Cities Service Oil Co. 2-170 Swenson had perforated the Caddo from 4,768-75 and 4,780-90 ft. and was swabbing. It is a confirmation test to the 170 Swenson, discovery well which completed from two sections of the Caddo, at 4,730-47 ft. and 4,903-12 ft.

Robert S. Lytle 2 W. B. Stephens, confirmation well and north offset to the 1 Stephens, conglomerate discovery northeast of Jacksboro, recovered 300 ft. of free oil on a drill-stem test in conglomerate from 5,057-95 ft. Gas surfaced in 5 minutes and oil flowed in 30 minutes. Time on the test was 30 minutes. A second test from 5,395-5,410 ft. recovered salt water.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Taylor Drilling Co. 1 A. Coffelt, Wm. Baker Sur., 6 mi. SW Archer City, TD 1,232 ft., pay 1,229 ft., pumped 51 bbl. 36°-gravity oil a day, GOR 100 cu. ft.

Callahan County: United North & South Development Co. 3 Welden Edwards, Blk. 14, BBB&C Sur., 8 mi. SW Clyde, TD 1,284 ft., pay 1,272 ft., flowed 83.2 bbl. 41°-gravity oil a day, ¼-in. choke, TP 30 psi., GOR 350 cu. ft.

United 4 Weldon Edwards, Sec. 14, BBB-&C Sur., 8 mi. SW Clyde, TD 1,288 ft., pay 1,278 ft., flowed 198 bbl. 41°-gravity oil a day, ¼-in. choke, TP 90 psi., GOR 350 cu. ft.

Clay County: Fred M. Manning 1 Sanzenbacher, T. Bates Sur., 2 mi. SE Bluegrove TD 6,411 ft., Pennsylvanian pay 5,807 ft., pumped 62.3 bbl. 42°-gravity oil a day, GOR 500 cu. ft.

Cooke County: Virgil Taylor 1 S. D. Meador, G. Ivey Sur., 5½ mi. NW Muenster, TD 1,610 ft., pay 1,504 ft., pumped 73 bbl. 40°-gravity oil a day.

Jones County: Con-Tex Petroleum Corp. 1 Pearce & Creel, 5-1-T&NO, 2 mi. SW Anson, TD 2,538 ft., Flippen 2,502-16 ft., 110.8 bbl. 37°-gravity oil in 5 hr., open 2-in. tubing, GOR 200 cu. ft., TP 20 psi.

Woodley Petroleum Co. 1 I. L. Weaver, extension, 6-17-T&P, 2½ mi. SW Truby, TD 4,573 ft., Canyon sand 4,560-73 ft., flowed 77.5 bbl. 41°-gravity oil a day, 14/64-in. choke, GOR 525 cu. ft., TP 190 psi.

Stonewall County: F. Kirk Johnson 1 Leon Anderson, 18-U-T&P, TD 5,941 ft., elev. 1,791 ft., Ellenburger 5,928-41 ft., flowed 198 bbl. 41°-gravity oil a day, ¼-in. choke, GOR 708 cu. ft., TP 180 psi.

Sid Katz and R. H. Venable 1 Dozier, Ruth Campbell Sur. 50, 8 mi. W O'Brien, TD 4,834 ft., elev. 1,490 ft., Strawn sand 4,825 ft., flowed 132.5 bbl. 37°-gravity oil a day, ½-in. choke, GOR 220 cu. ft., CP 120 psi., TP 10 psi.

Skelly Oil Co. 1 Wm. Flowers, 54-D-H&TC, 5 mi. SE Aspermont, TD 4,189 ft., elev. 1,808 ft., Canyon sand 4,166-89 ft., flowed 165.5 bbl. 42°-gravity oil in 4 hr., ¾-in. choke, GOR 489 cu. ft., TP 575 psi.

Wichita County: Ted A. Norwood 6 Gertrude Lockridge, Louisia Netherly Sur., 6 mi. SW Iowa Park, TD 2,971 ft., pay 2,956 ft., pumped 42 bbl. oil a day.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: C. G. Butts 1 J. Cernocek, TE&L Sur., 1½ mi. SE Megargel, dry, TD 1,475 ft.

S. D. Johnson 6 J. L. Prideaux, TE&L Sur., 8 mi. SW Windthorst, dry, TD 4,086 ft.

Baylor County: J. J. Lynn 1-G Claude Cowan, Blk. 117, A-352, T&NO, 14 mi. NE Seymour, dry, TD 4,760 ft.

Clay County: Fortex Oil Corp. 1 G. D. Rigsby, Blk. 2, Wyatt Subd., 2½ mi. SW Thornberry, dry, TD 1,374 ft.

Jack Grace 1-A Hapgood, J. Walker Sur., 7 mi. NW Bellenvue, dry, TD 4,873 ft.

Geo. S. Golden 1 Geo. S Myers, E. Story Sur., 5 mi. W Petrolia, dry, TD 2,000 ft.

S. D. Johnson 1 Nellie B. Green, A. Dickerson Sur., 1 mi. NW Henrietta, dry, TD 6,301 ft.

Coleman County: Glass, Hagan, Norton & Scott 1 H. N. Templeton, Sec. 6, HT&B, ½ mi. S Silver Valley, dry, TD 3,495 ft.

Richard King et al 1 A. C. Sparks, 95-1-GH&H, 10 mi. S Coleman, dry, TD 2,855 ft., elev. 1,599 ft., Caddo 2,380 ft., Marble Falls 2,804 ft.

French M. Robertson 1 R. M. Freeman, H. Haddock Sur. 118, 4 mi. S Novice, dry, TD 3,505 ft., Fry 3,360 ft., Jennings 3,466 ft.

Cooke County: T. P. Frost 1 Ramsey, B.

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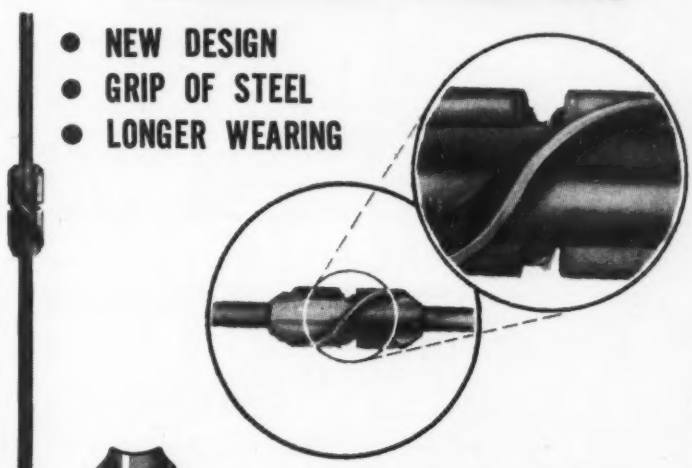

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Lusk Sur., 10 mi. N Muenster, dry, TD 1,335 ft.

Fisher County: Michael Porges 3 Davidson, 59-1-HT&B, 1½ mi. W McCauley, dry, TD 3,170 ft.

Jones County: Andree Drilling Co. 1 Clyburn, 2-20-T&P, 4 mi. SE Hawley, dry, TD 2,010 ft.

Carl Hovgard 1 Maxey-Harvey, 19-14-T&P, 5 mi. SE Nugent, dry, TD 2,280 ft.

French M. Robertson 1 W. N. Munroe, 3-2-T&NO, 9 mi. SE Anson, dry, TD 2,490 ft., elev. 1,734 ft., Cook sand 2,180 ft.

Carl S. Shoultz 1 R. M. Cox, Sec. 3, GH&H, 7 mi. SE Hamlin, dry, TD 3,305 ft., elev. 1,659 ft., Dothan 2,220 ft., Flippen 2,615 ft., Hope 2,765 ft., King 3,005 ft., lower Swastika 3,168 ft.

Mills County: Burk Royalty Co. 1 Reeves, Michael Rhyme Sur., 25 mi. SE Brownwood, dry, TD 920 ft., water in lime 822 ft., Ellenburger 830 ft., completed as water well.

Parker County: Kingwood Oil Co. 1 H. W. Parks, F. M. Harris Sur., 3 mi. NW Springton, dry, TD 3,778 ft., Caddo 3,572 ft.

Shackelford County: C. E. Groover 1 L. G. Davis, 39-12-T&P, 9 mi. SW Albany, dry, TD 1,560 ft.

Stephens County: Drilling & Exploration Co. 1 S. O. Patton, 14-18-T&P, 2 mi. SW Merkel, dry, TD 2,834 ft., elev. 1,898 ft., Flippen 2,733 ft., Cook 2,788 ft.

Throckmorton County: Arkansas Fuel Co. 1 G. H. Roach, Blk. 2,156 ft., 6 mi. SW Throckmorton, dry, TD 5,211 ft., elev. 1,205 ft., Caddo 4,388 ft.

Wichita County: H. F. Snebold et al 1 G. S. Hawkins, Samuel Anderson Sur., ¼ mi. S Burkburnett, dry, TD 1,653 ft.

Wilbarger County: Craig & Neal 5 W. T. Waggoner, 37-4-H&TC, 7 mi. SW Harrold, dry, TD 1,951 ft.

Neeld & Hood Drilling Co. 2 W. T. Waggoner, 36-6-H&TC, 3 mi. W Electra, dry, TD 1,875 ft.

Young County: Bay Petroleum Corp. et al 1 W. A. Morris, TE&L Sur., 2½ mi. NW Murray, dry, TD 3,005 ft.

L. T. Burns 1-A V. Lowry, TE&L Sur. 291, 3½ mi. W Jean, dry, TD 3,239 ft.

Mid-Continent Petroleum Corp. 1 B. W. King, TE&L Sur. 631, 2 mi. SE Jean, dry, TD 5,208 ft.

Mississippi

First Gas Discovery of Year Finaled in Forrest County

JACKSON.—Mississippi's first gas discovery for the year has been completed at I. P. LaRue 1 Creosote Oil Corp., 7-1s-13w, Forrest County. Through perforations at 7,722-26 ft., the well was completed for 1,686,000 cu. ft. of gas plus 27 bbl. of condensate per day through 12/64-in. choke. Tubing pressure was 2,480 psi. On open-flow potential, the well made 8,200,000 cu. ft. of gas daily. The new field has been named Pistol Ridge.

In Jefferson County, Sinclair Oil & Gas Co. 1 R. T. Liddell, et al, prospective discovery in 67-9n-1e, has resumed coring after running drill-stem test at 10,052-64 ft. Core from 10,064-114 ft. recovered 5½ ft. of sand with gas show and 15 ft. of shale. This gives an estimated total of 12 to 14 ft. of gas sand. Earlier, Sinclair cored at 10,052-64 ft. in the Lower Tuscaloosa zone recovering 2½ ft. of good gas-condensate sands. Following recovery, operator ran drill-stem test on the interval and in 19 minutes working pressure rose to 5½ psi. Tool was then shut in for 12 minutes. When opened, it bled off fluid and blew wash water and rich gas for 1½ hours. Tool was pulled with recovery being one stand of condensate, seven stands of mud cut with wash water, and three stands and one double stand of water cushion. At latest report, well was coring below 10,169 ft.

In Stone County, at the world's second deepest hole, George Vasen is coring below

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19,745 ft. at his 1 fee, 9-2s-11w. Operator is releasing no information on the wildcat.

Barnett Serio and Petersen Drilling Co. have drilled to total depth of 6,814 ft. and are running 5½-in. production casing at 2 Hydr R. Jenkins, 19-5n-3w, in Glen Aubin field, Adams County. Operators side-wall cored in the Wilcox zone, recovering 4 ft. of saturated oil sand at 6,620-25 ft. and 7 ft. of good oil sand at 6,698-706 ft.

MISSISSIPPI SUCCESSFUL WILDCAT

Forrest County: Gas-condensate discovery, "Pistol Ridge"—I. P. LaRue 1 Creosote Oil Corp., 7-1s-13w, TD 9,010 ft., perf. 7,722 ft., IP: 1,686,000 cu. ft. of gas per day plus 27 bbl. condensate, 61.4° gravity, 12/64-in. choke, TP 2,480 psi.

MISSISSIPPI WILDCAT FAILURE

Wayne County: Ralph Stanley & S. B. Daws 1 Masonite Corp., 24-10n-8w, dry, TD 5,513 ft.

Michigan

Two Offsets to Skeels Field Considered Failures

MOUNT PLEASANT.—The first two offsets to Don Rayburn's 1 Cassidy, Skeels field Dundee oil discovery well in Sherman Township of Gladwin County missed top of Dundee dolomite oil pays and were rated failures. One of these tests may be carried deeper to the Richfield, however. Both of the offsets failed to log dolomite in the top of the Dundee, the pay section from which the 1 Cassidy is being flowed at a restricted rate of 125 bbl. of oil a day natural, against an open flow estimated potential of 5,000 bbl. a day or more. First of the two offsets to be completed as a failure in the Dundee was the diagonal southeast 10-acre offset to the discovery—Rayburn's 1 Tressler, NE NW SE 31-20n-2w, Dundee lime was topped at 3,843 ft. and hole was bottomed out for plug at 3,966 ft. with 260 ft. of salt water showing in two hours on drill-stem test of the section from 3,947-66 ft. Some pin-point porosity and bleeding-oil shows were reported in top cores in the Dundee.

The southwest diagonal 10-acre offset to the Cassidy discovery producer, Sun Oil Co. 1 Smith, NE NE NW 31-2on-2w, logged Dundee top (limestone) at 3,822 ft. and was being drilled at 3,909 ft. this week. Test may be cored further in the Dundee and may also be deepened to the Richfield. A drill-stem test of the top of the section, with packer set at 3,816 ft., showed a recovery of 10 ft. of drilling fluid in 60 minutes.

Rayburn had staked both the northeast and northwest diagonal 10-acre offsets to the discovery producer and was moving rotary tools to the 2 Cassidy, NE SW SE 30-20n-2w, the northeast offset.

Failure at both offsets to this big well came more as a disappointment than as a total surpise to Michigan oil operators. It was generally agreed throughout the industry that the definition of a Dundee dolomite Skeels oil field might be hazardous, costly in dry holes, and discouraging.

MICHIGAN SUCCESSFUL WILDCAT

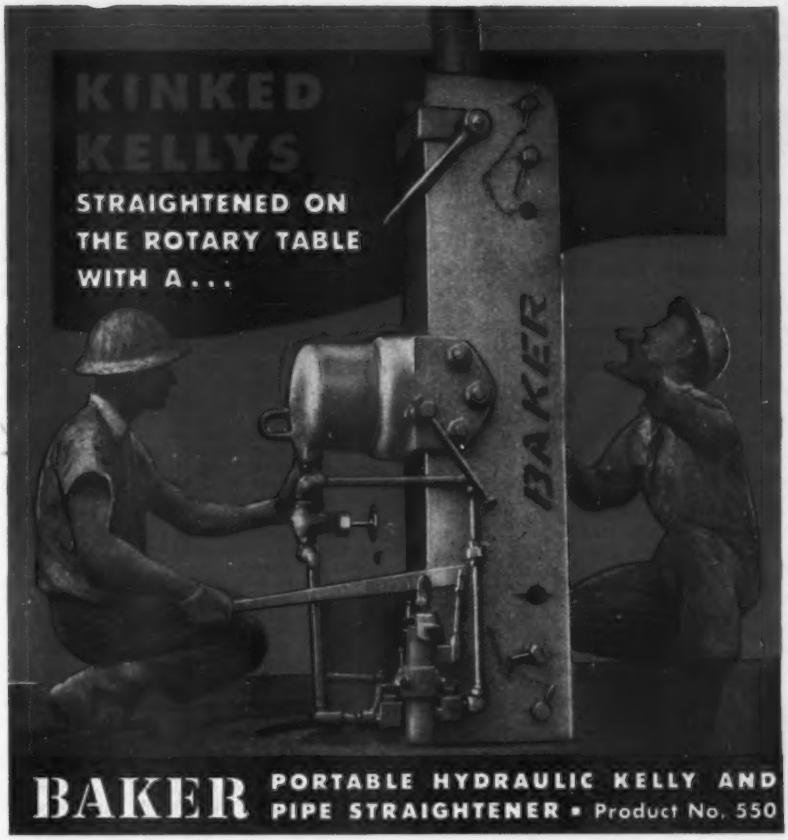
Mecosta County, Green Township: New shallower pay in Paris field—Cities Service Oil Co. 1 McFarlane, SE NW SE 21-16n-10w, Stray 1,215 ft., pay 1,217-23 ft., 1,540,000 cu. ft. gas, TD 3,493 ft., PBTD 1,222 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Clyde Township: F. W. Kehlet 1 Modrak, SW SE NE 22-2n-15w, Traverse 1,281 ft., dry, TD 1,288 ft.

Arenac County, Standish Township: W. T. McKenna 1 Schwartz, NW NE SW 1-18n-4e, Dundee 2,951 ft., dry, TD 2,993 ft.

Ionia County, North Plains Township: Mercer Oil Co., Inc. 1 Bussee, NE NW SE



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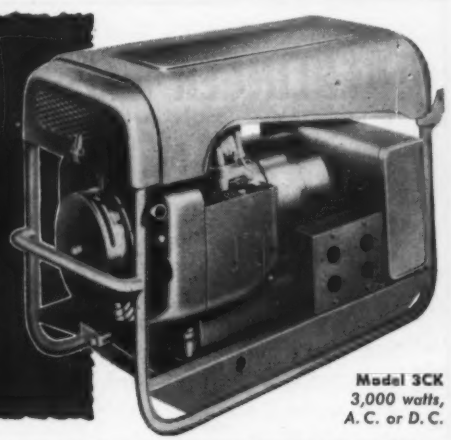

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21-8n-5w, Dundee 2,970 ft., dry, TD 3,020 ft.

Van Buren County, Geneva Township: James A. Blackmer 1 Johnson & Hodgens, NE SW SW 12-1s-16w, Traverse 1,153 ft., dry, TD 1,169 ft.

Permian Basin

Prospective Wolfcamp Oil Discovery Has Good Show

MIDLAND. — Ralph Lowe 1 J. E. Hill, prospective Wolfcamp discovery southwest of Midland, was flowing and swabbing around 18 bbl. of fluid an hour, following acid treatment in open hole at 9,440-9,850 ft. Most of the fluid was new oil, and reports indicated the well was flowing with the exception of a few trips of the swab to clean out acid residue.

James H. Snowden and others' 1-58 McClintic, Midland County wildcat, prepared to treat with Hydrafrac after oil recovery on the swab decreased from 4 to 2 bbl. hourly. Treatment was to be made in the Spraberry section from 7,212-49 ft.

Drilling reports on other Midland explorations were: Magnolia Petroleum Co. 1 Jo Jo Parks was drilling at 8,820 ft.; Magnolia's 1 Preston was drilling at 4,516 ft., and their 1 Benge was below 4,050 ft. Northeast of Lowe 1 Hill, Jay Simmons 1 J. W. Countiss, had casing set at 4,503 ft. and was waiting on cement.

The Spraberry sand, which accounted for a large share of last year's exploratory drilling, and which also yielded many new areas, has been added to the Benedum area of Upton County.

On the north side of the field, in Section 4-Y-CCSD&RGNG, ¾ mile northwest of nearest production in the field, Blackwood & Nichols Co. 1 Humble-Eager completed for a flowing potential of 172.5 bbl. of 29.5°-gravity oil. The test was through ¾-in. opening on tubing and from the Spraberry at 7,488-7,513 ft. The Benedum area now has two pays in the Permian, as well as pay from the Pennsylvanian, Fusselman of the Silurian, and the Ellenburger.

Union Oil Co. of California 1-76 University, Reagan County wildcat west of the town of Big Lake, flowed an estimated 8-10 bbl. of 39°-gravity oil an hour on a drillstem test in limestone at 9,097-9,118 ft., then cored ahead to 9,126 ft. but was out of the pay section. It was drilled ahead to 9,160 ft. and stopped for electrical surveys. Field sources thought the oil-bearing section was Strawn. Projected depth was to 9,800 ft. as an Ellenburger test.

Havenstrite Oil Co. 1-1 Pembrook-Beal, southeast extension to the Pembrook Spraberry field, was shut in after flowing 380 bbl. of 39°-gravity oil in 24 hours through 40/64-in. choke. Perforations were from 6,936-7,030 ft.

In Dawson County, northeast of Lamesa, James H. Snowden 1-30 Dean ran a 10-hour and 45-minute test from 7,275-7,322 ft., which had gas in 27 minutes and unloaded 5,750 ft. of oil while pipe was being pulled. Operations had been shut down for repairs due to fire which started while coming out of the hole. The section tested was the lower Spraberry.

Snowden's 1-32 Dean, wildcat in the same area, recovered 2,160 ft. of oil and some salt water on a 6-hour test at 7,273-7,313 ft., and later recovered 1,100 ft. of oil on a 4-hour test from 7,397-7,425 ft. There was no water reported on the latter test.

Standard Oil Co. 1 Pool, Dawson County wildcat southwest of Welch, recovered 360 ft. of oil and gas-cut mud on a test in the Wolfcamp at 8,337-64 ft., on which mechanical trouble developed in 12 minutes. Second attempt of the interval recovered 850 ft. of oil-cut mud, 100 ft. of clean 42°-gravity oil and 225 ft. of salt water. It was to drill ahead.

Cities Service Oil Co. and Continental Oil Co. 1-AH University, Ellenburger discovery south of the Benedum field, completed for 511 bbl. of 60°-gravity oil in 6 hours, flowing through ¾-in. choke from perforations at 10,811-841 ft. The well also made 36 bbl. of water on the test.

The same operators made location for their 1-AM University in Section 32, about ½ mile south of the 1-AH discovery.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crane County: Placid Oil Co. 1 A. R. Eppenauer, 14-6-H&TC, 10 mi. S Crane, TD 3,001 ft., elev. 2,380 ft., San Andres 2,382 ft., perf. 2,710-30 ft., flowed 134 bbl. 38°-gravity oil a day, ⅜-in. choke, GOR 915 ft., TP 75 psi.

Ector County: Texas Gulf Producing Co. 1 J. E. Parker, extension TXL-Clear Fork area, TD 5,905 ft., pay 5,580-5,905 ft., flowed 177.6 bbl. 38°-gravity oil a day, 20/64-in. choke, GOR 750 cu. ft., TP 75 psi.

Runnels County: Bishop Oil Co. 1 M. J. Adams, 13-129-C. P. Skidmore Sur., 6 mi. NW Winters, TD 4,401 ft., elev. 1,909 ft., Fry sand 4,381 ft., pay 4,385 ft., flowed 101 bbl. 42°-gravity oil in 4 hr., ½-in. choke, GOR 947 cu. ft., TP 250 psi.

Upton County: Magnolia Petroleum Co. 1 C. W. Ryburn, 1-O-EL&RR, 10 mi. NE Upland, TD 7,081 ft., elev. 2,710 ft., Spraberry 7,020 ft., shot 7,000-81 ft., pumped 84.6 bbl. 38°-gravity oil a day, GOR 635 cu. ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Coke County: Spartan Drilling Co. 1 L. E. Smith, Sec. 2, GC&SF, 4½ mi. NW Tenneyson, dry, TD 6,382 ft., elev. 1,915 ft., Home Creek 4,362 ft., Palo Pinto 4,883 ft., Capps 5,738 ft., Ellenburger 6,165 ft.

Crockett County: Childress & Miller 1 Archie Bean, 13-UV-GC&SF, 20 mi. W Ozona, dry, TD 1,466 ft.

Ector County: Stanolind Oil & Gas Co. 1 J. L. Johnson, 31-43-1S-T&P, 7½ mi.

(Continued on page 131)

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A-83

Eastern Texas

Oil Creek Producer Is Assured in Sandusky Field

DALLAS.—Another Oil Creek producer was assured the Sandusky field of northwest Grayson County at The Texas Co. 1 M. A. Scarborough, E. L. Stickney Survey. On drill-stem test from 7,164-72 ft., mud flowed at the surface in 14 minutes, gas in 20 and oil in 23 minutes. In 13 hours it flowed 248 bbl. of oil through ¼-in. choke. Earlier tests produced formation water, which apparently had been shut off by cementing. Location is a west offset to Oil Creek production and an east offset to an Ellenburger well.

About 4 miles southeast of nearest Ellenburger production in the Sandusky area, Howell & Howell 1 J. C. Mulder, J. Barefoot Survey, recovered 1,250 ft. of 38°-gravity oil on a 1-hour test in the Ellenburger at 7,588-7,600 ft. On the test, oil flowed in 15 minutes. Total depth was 7,888 ft., plugged back to 7,665 ft. where casing was set. At last report, casing had been perforated from 7,568-7,600 ft. and the well was flowing to clean itself at the rate of 10 bbl. of oil in an hour through 13/64-in. choke. D. D. Feldman, Dallas, half-interest owner in the well, was reported to have taken over operations.

Big Chief Drilling Co., Shreveport, has filed application to drill a 9,800-ft. test in the Tennessee Colony area of Anderson County. The test is to be 1 M. Hughes, 1 mile northeast of Tennessee Colony and between the field proper and The Texas Co.'s 1 Holmes, recently completed outpost.

In Houston County, W. B. Hinton and Ralph Spence 1 C. L. Walters, LaRiviere Survey, had the rig moved off and was installing a swabbing unit. Testing was to continue through perforations in the sub-Clarksville at 5,752-56 ft. where the well had a show of oil and gas.

In Limestone County, The Texas Co. 1 Lulu Mason, Rodessa gas discovery, was coring ahead at 7,310 ft. and looking for top of the Pettit limestone.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: Leoray Oil Co. 1 R. B. Conner, Wm. Hannum Sur., 1½ mi. E Rosebud, dry, TD in Edwards approximately 2,234 ft.

Robertson County: Earl Allen 1 B. W. Clements, N. F. Roberts Sur., 3 mi. W Franklin, dry, TD 6,318 ft.

Wood County: J. M. Deupree et al 1 H. H. Moore, J. B. Tucker Sur., A-577, dry, TD 6,426 ft., anhydrite 4,749-4,940 ft.

R. R. Jackson et al 1 R. E. Wisenbaker, Andrew Hamilton Sur., A-285, dry, TD 7,360 ft.

Texas Gulf Coast

Wilcox Well in Victoria County Gets Potential

HOUSTON.—Kirby Petroleum Co. has potentialed 1 R. T. Buchanan, new Wilcox discovery in Victoria County, for 274 bbl. of 33.5°-gravity oil daily, through ¼-in. choke. Production was through perforations at 8,147-62 ft. This new field is located in Indiola RR Survey, Abstract 204, 2 miles south-southeast of Helen Gohlke field, also a recent Wilcox discovery.

Kirby has set surface casing and is preparing to drill 1 A. R. McGehee-Eva Schwabe Unit, located in the same survey, 1,850 ft. north-northwest of 1 Buchanan. Projected depth is 8,500 ft.

Oil production has been opened in Maley field, Bee County, at Superior Oil Co. 3 Celia Maley, et al, AB&M Survey, Abstract 79. Through perforations at 7,384-96 ft. and 7,403-15 ft., the well flowed 112 bbl. of 31.4°-gravity oil daily through 12/64-in. choke. Tubing pressure was 660 psi.

Two miles northwest of Altair, Colorado County, Superior Oil Co. is coring at 11,275 ft. in D-1 Mrs. Mathilda Tait, a scheduled 13,000-ft. wildcat in John Byrne Survey, Abstract 12. Gas-condensate production has been assured by an earlier drill-stem test which operator conducted at 10,448-58 ft. The well flowed 52 bbl. of 49.8°-gravity condensate plus 2,283,000 cu. ft. of gas per day.

In Jasper County, American Republics Corp. and Houston Oil Co. of Texas are running log after testing oil at 1 M. B. Hughes, et al, wildcat test 2 miles north of Bessmay in Henry Webb Survey, Abstract

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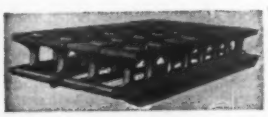

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42. Hole is bottomed at 8,100 ft. Earlier drill-stem tests run at 6,992-99 ft., 6,857-61 ft. and 7,048-52 ft. had good showing of oil, the test being at 6,992-99 ft. where operator recovered an estimated 18½ bbl. of 39.7°-gravity oil.

The dormant Green's Lake field of Galveston has been revived at John W. Mecom 10 J. D. Hughes, Sara White Survey, Section 16. The well was originally drilled to a depth of 6,902 ft., and completed in October 1940, as an oiler at 6,574-81 ft. The well declined in production due to water encroachment and was abandoned in 1942. Recently, Mecom drilled the well 12 ft. deeper to a depth of 6,914 ft. Perforations were made at 6,440-45 ft. and it flowed 295 bbl. oil per day through 10/64-in. choke. Gravity of the oil was 32.3° and GOR 1,083-1.

The 62 new locations include 15 wildcat starts, 1 each in Orange, San Jacinto, Austin, Brazoria, Harris, Jasper, Calhoun, Jackson, and Live Oak counties; and 2 each in Fort Bend, Matagorda, and Jefferson counties.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Goliad County: New oil pool—Magnolia Petroleum Co. 5 Wilkinson Estate, Wm. P. Miller Sur., 2½ mi. N of Berclair, TD 3,280 ft., perf. 3,207-09 ft., IP: 73 bbl. oil per day, 8/64-in. choke, 20.9° gravity.

Liberty County: New pay at North Dayton—Corley & Geiselman, et al, 1 Paraffine Oil Co., Edmond Pruitt Sur., A-448, TD 8,520 ft., perf. 8,110-20 ft., IP: 10,600,000 cu. ft. of gas per day, open flow, SIP 3,065 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Brazoria County: Kathryn B. Miller 1 Sara Jane Blaffer, et al, J. M. O'Donnell Sur. 26, A-475, 3½ mi. SE of Manvel, dry, TD 8,256 ft.

Victoria County: Miller-Wells, Inc., 1 Johnny Pierce, John D. Wright Sur., A-125, dry, TD 4,640 ft.

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Oklahoma

Payne County Wildcat Blows in from Wilcox

WHAT appers to be an important Wilcox sand discovery has been made by T. W. and J. M. Loffland, Jr., at their 1 Stanolind-Amerada, NE SW SW 27-18n-4e, southwest of the Broyles pool, 3 miles east of Ripley, southern Payne County.

The well blew in through open casing before plug was entirely drilled out. It flowed 40 bbl. of oil in the first 30 minutes, and 105 bbl. in the first 3 hours. A substantial volume of gas accompanied the flow. The well was killed after it had produced more than 200 bbl., and at latest report tubing was being run for production tests.

Total depth is 4,025 ft. with top of the first Wilcox sand and casing point at 4,002 ft.

Reports from Stephens and Carter counties in southwestern Oklahoma continue to highlight Oklahoma development. Off the north end of Sholem Alechem in the rapidly developing Ara area, Sinclair Oil & Gas Co. 1 Neal School Unit, SE NW SE 33-1n-4w, swabbed 230 bbl. of oil in 21 hours from Springer sands at 5,416-30 ft. and 5,439-76 ft. In adjacent Carter County on the north flank of Southwest Lone Grove pool, George B. Blaylock and J. D. Lewis 2-A Duke, SE NE NW 5-5s-1w, flowed 480 bbl. of oil in 16 hours through chokes from the Oil Creek topped at 4,260 ft. Simpson production in this area was opened about 1 year ago. In the southeast extension area of Velma field, Stephens County, Sun Oil Co. 4 Robinson, NW NE SE 3-2s-4w, flowed 597 bbl. of oil in 24 hours through casing after the Springer sand was exposed.

In the play extending west from the north part of West Edmond field in Kingfisher County, Anderson-Prichard Oil Corp. 3-A Dickerson, SE NE NW 26-15n-5w, flowed 195 bbl. of oil in 18 hours through a 32/64-in. choke. Perforations are opposite the Bartlesville sand at 6,708-18 ft.

Out in Beckham County Carter Oil Co. 1 State-Taylor, C SW SW 31-9n-21w, recovered 240 ft. of mud (lower 90 ft. of which was gas cut) during a 105-minute test at 6,575-6,625 ft.

Anderson-Prichard Oil Corp. 1 McDaniel, C NE SW 34-5n-4w, made 24 bbl. of distillate through ¼-in. choke in 3 hours before freezing up during a drill-stem test of a sand at 11,810-30 ft. Gas volume registered between 2.6 and 3 million cubic feet daily.

In the greater Seminole area Frank Buttram's rank wildcat in southwestern Pottawatomie County, 1 State in the SE SE NE 36-7n-2e, bailed 20 bbl. of oil in 24 hours from a sand at 4,319-24 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Bryan County: Renwick & Hill 2 Olson & Bundy, NE SE SW 29-6s-7e, 1 mi. S and 1¾ mi. SE Aylesworth, pumped 1 bbl. oil per day from sand at 865-927 ft., TD.

Garvin County: Pray et al 1 Miller, C NW SW 11-4n-4w, flowed 93 bbl. oil per day from fifth Deese at 7,900-60 ft., TD 8,111 ft., OWWO, no tops reported.

Osage County: Fitzhugh & Wiemer 1 Osage, NE NW NE 12-23n-10e, pumped 20 bbl. oil per day from Bartlesville 1,727-69 ft., Big lime 1,202 ft., Oswego 1,389 ft., lime 1,635 ft.

Payne County: The Texas Co. 1 Pitts, SE SE NE 30-19n-4e, flowed 31 bbl. oil per day from Skinner at 3,552-62 ft., TD 3,949 ft., Lenopah 3,058 ft., conglomerate 3,198 ft., second conglomerate 3,342 ft., Oswego 3,368 ft., Prue 3,474 ft., Verdigris 3,542 ft., lime 3,684 ft., Red Fork 3,750 ft., Mississippi lime 3,926 ft.

OKLAHOMA WILDCAT FAILURES

Beaver County: Huber 1 Light est., C SW SE 8-6n-21ecm, dry, TD 6,807 ft., Herrington 1,624 ft., upper Krider 2,660 ft., lower Krider 2,675 ft., Winfield 2,750 ft., upper Ft. Riley 2,809 ft., lower Ft.

Riley 2,862 ft., Lansing 4,372 ft., Mississippi 6,150 ft., Chester 6,251 ft.

Carter County: Big Chief Drilling 1 Sturm, NE SW NE 2-3s-3w, dry, TD 5,219 ft., top Deese 3,025 ft., fusilinid sand 4,060 ft., Tussy 4,512 ft., basal Pennsylvanian-Woodford 5,104 ft., no Springer.

Samedan 1 Tayar, NE NE NE 10-3s-3w, dry, TD 7,983 ft., Pontotoc-Hoxbar 1,505 ft., Deese 4,148 ft., fusilinid sand 5,144 ft., Tussy 5,783 ft., detrital lime 6,465 ft., Springer 6,625 ft., sand 6,908 ft. and 7,151 ft.

Cleveland County: Olson Drilling 1 Brandenburg, SW NE SE 6-6n-1e, dry, TD 6,863 ft., Pawhuska 2,915 ft., Belle City 3,880 ft., Hogshooter 4,390 ft., Layton 4,450 ft., Checkerboard 4,805 ft., Bartlesville 5,876 ft., Woodford 6,040 ft., Hunton 6,121 ft., Sylvan 6,305 ft., Viola 6,430 ft., dense 6,732 ft., dolomite 6,838 ft., second Wilcox 6,857 ft.

Garfield County: British-American Oil Producing Co. 1 Rehorn, SE SW SW 34-24n-4w, dry, TD 6,307 ft., Pawhuska 2,585 ft., Oread 3,300 ft., Lovell 3,500 ft., second Tonkawa 3,770 ft., third Tonkawa 4,142 ft., Layton 4,400 ft., Hog-

(Continued on page 131)

South Louisiana

New Field Indicated Northwest of Bear Area

NEW ORLEANS.—A new oil field is indicated at Fidelity Oil & Royalty Co. 1 Edgewood Land & Log Co., 18-6s-9w, 2¾ miles northwest of Bear field production in Beauregard Parish. Pay was topped at 8,543 ft., and operator ran a drill-stem test from 8,543-58 ft. Recovery was 36.9°-gravity oil. Approximately 23 ft. of effective sand was encountered in the wildcat. At last report, operator was drilling at 8,838 ft. with an ultimate goal of 9,500 ft.

Sun Oil Co. is continuing to test its new Calcasieu Parish strike, 1 Dr. W. F. Brooks, CNE SW 20-10s-12w, 2 miles northwest of Vinton field. Through perforations at 10,-868-80 ft., the well flowed an estimated 30 to 70 bbl. of oil and mud for 18 hours. Tubing pressure was recorded at 2,150 psi. The 10/64-in. choke was reduced to 7/64-in., through which the well flowed dry gas for 14 hours, after which white condensate appeared. The wildcat was drilled to total depth of 11,346 ft., plugged back, and drilled to 11,002 ft. in sidetracked hole. Operator set 5½-in. casing on bottom. On a previous test, the well flowed 150 bbl. of 46°-gravity oil through the same perforations.

At Magnolia Petroleum Co. N-1 Doornbos-McPherson, deep new Wilcox pay in Hurricane Creek field, Beauregard Parish, operator is facing a hazardous job in combating high pressures. The well was recently completed for 1,512 bbl. of oil per day from open hole at 14,530-73 ft. through 12/64-in. and 15/64-in. chokes. Operator decided to go back into the hole and rework in an attempt to reduce the gas-oil ratio. As drill pipe went through the sand, terrific pressure was encountered, and a full string of drill pipe was lost in the hole. Two take-off lines from the casing have been installed where pressure is 4,300 psi. One flow line is taking care of the terrific gas flow, and fear has been expressed that if the well were shut in, it might crater. Crews are rigging up for Magnolia P-1 Doornbos-McPherson, 23-5s-8w, directly west of the flowing well. It will be drilled directionally toward the N-1 Doornbos-McPherson to relieve the tremendous pressure.

Superior Oil Co. 1 Clovelly Corp., wildcat, 33-18s-22e, on the Brustle Prospect, La-Fourche Parish, is at total depth of 12,425 ft. with 7-in. casing cemented on bottom. Electrical survey was run to total depth before setting casing, but it is unknown at present whether or not the log indicated commercial possibilities.

The 17 new locations include 2 wildcat starts, 1 each in Avoyelles and Beauregard parishes.

Ohio Fields

Coshocton County Test Successful in Clinton

COLUMBUS.—John Morrow et al stepped out a mile northeast of the old part of New Castle pool and brought in a fair well that may be either an extension or the opener of a new field. The producer is just west of Walhonding on E. O. Rodehaver, second quarter, New Castle Township, Coshocton County. Clinton sand was found at 3,083-3,125 ft. with an oil showing at 3,108-16 ft. which made 40 bbl. in 24 hours after shot.

Mid East Co. moved ½ mile northwest of their Endsley and brought in a good well on Howard Neldon, third quarter, New Castle Township, Coshocton County. Clinton at 3,218-83 ft. made 40 bbl. natural, and 127 bbl. in 24 hours after shot.

In Jackson Township, Knox County, C. A. Davis et al found 675,000 cu. ft. of gas natural in the upper Clinton at 3,080-3,107 ft. at the 1 D. S. Farmer, Section 2. The well was not shot. In Section 10, Wray Drilling Co. 1 Glen Kidwell found oil shows in both the upper and lower sands, and made 35 bbl. in 24 hours after shot. The Clinton was logged at 3,040-88 ft.

Clinton Oil Co. 2 W. S. McCracken, Section 8, Hopewell Township, Licking County, had a good show of oil in the Clinton, found at 2,993-3,040 ft., and made 76 bbl. in 24 hours after shot. In the same township, Allen Willey et al 4 Caldwell and Currie, Lot 23, made 55 bbl. the first day after shot. The Clinton was reported at 3,045-3,105 ft.

OHIO WILDCAT FAILURE

Guernsey County, Liberty Township: Ham-

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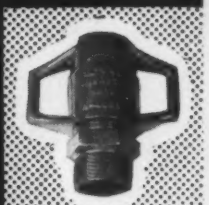

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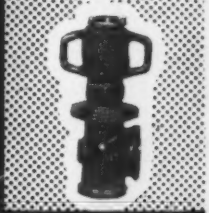

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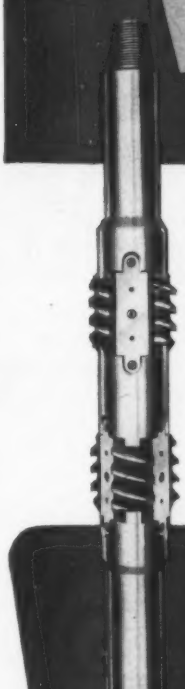

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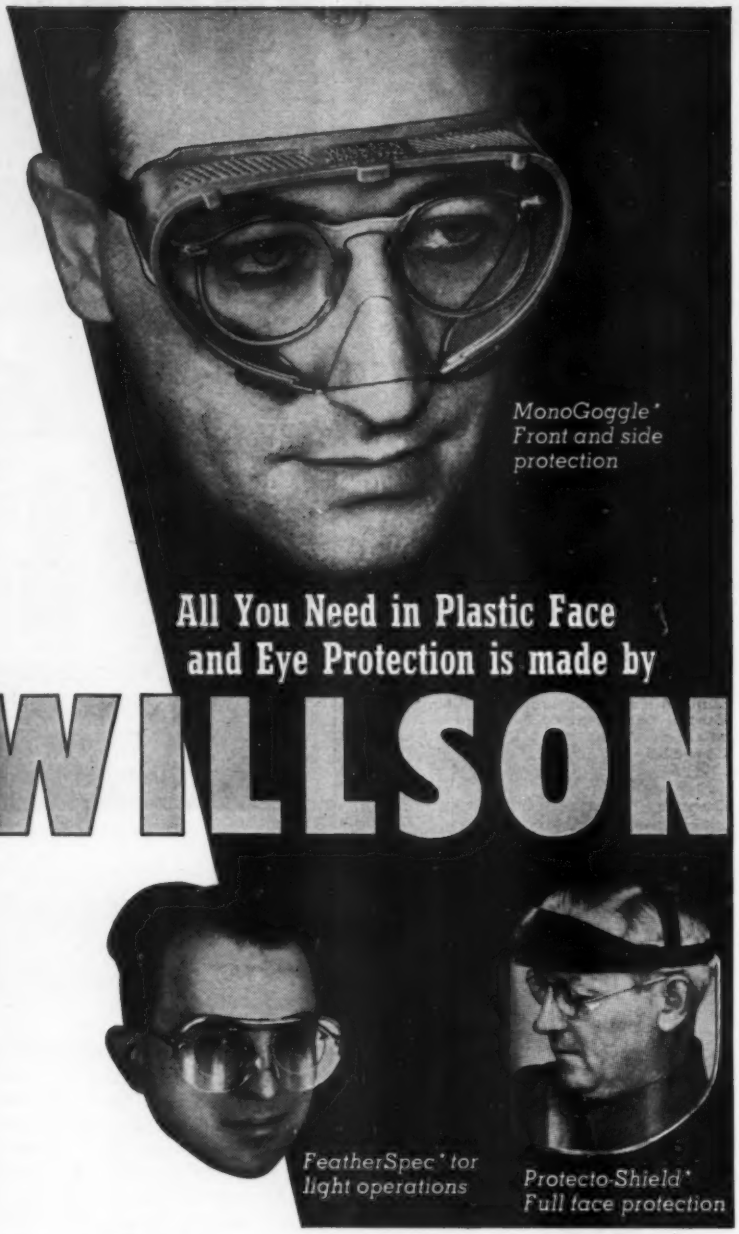

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mond et al 1 Clark, Sec. 3, dry, TD 3,466 ft., Oriskany 3,422 ft.

Canadian Fields

Drumheller Gets Second Oil Well

CALGARY.—Second oil success for Naco, Ltd., at Drumheller was assured when drill-stem test gave almost a full pipe recovery of light crude oil. The well, Naco-Drumheller 3, is the company's third in the Drumheller area, and its first follow-up to the discovery. The discovery well, currently on production, is scheduled for a rework job, after completion of this third well.

Naco 3 ran its latest test at 4,466-76 ft., and received a natural-gas flow rate of 1,500,000 cu. ft. daily, dwindling to zero as oil entered the pipe. Valve was open for 2 hours, and when pipe was pulled it contained 4,300 ft. of oil. First test in the productive zone was run at 4,446-53 ft., and gave a maximum gas flow rate of 10,000,000 cu. ft. daily, with a light distillate spray hitting the surface in 2 minutes. Pipe content from the 40-minute test was 30 ft. of distillate-cut mud. Second test, at 4,454-66 ft., gave a gas flow rate of 2,000,000 cu. ft. daily, with 1-hour pipe recovery of about 60 ft. of oil and mud.

The productive zone at Naco's Drumheller wells, tentatively called the "Naco sand," is in the basal section of the Lower Cretaceous. Well 3 topped the sand at 4,446 ft., at about the same elevation as it was encountered at the company's discovery well. Well 3 is located in LSD 11 36-29-20w4, ¼ mile south of the discovery, and around 65 miles northeast of Calgary. Crew is coring another 10 ft. from 4,476 ft., and will run further drill-stem test of that section.

The oil discovery well, Naco-Drumheller 2, in LSD 14 36-29-20w4, is currently producing around 40 bbl. daily. However, a large volume of gas is also being produced with the oil, and rig from well 3 will be skidded to well 2 for a squeeze-cement job in about a week or two. It is believed that further cement may cut down on the large gas flow.

Drumheller oil is 32.1° gravity. Naco's oil is being sold to the Calgary refinery of Imperial Oil, Ltd.

New British Dominion Oil Co., Ltd., has obtained a substantial flowing well at a Cretaceous discovery in North Woodbend, after carrying out additional perforations. New British recently purchased its partners' interest in that well and 800 acres in the vicinity. New British is also moving in drilling equipment for an immediate offset to the producer.

The well, Pacific-British Dominion 1, in LSD 4 36-51-26w4, after being reworked and reperforated, was completed as a flowing well. Prior to that the well had been making about 12 bbl. daily on pump. Well 1 has been on production tests during the past few days, and company officials stated that it was capable of making 40 bbl. hourly on open flush flow test. However, during a 4-hour test with 200 psi. pressure on tubing and 450 psi. on the casing, the well produced 84 bbl., or an average of 21 bbl. hourly. The well will be continued on test for the next day or two, at varying rates. The oil is about 37° gravity, and is water-free.

Next venture will be British Dominion-Woodbend 3, in LSD 1 35-51-26w4, ¼ mile west of the discovery well.

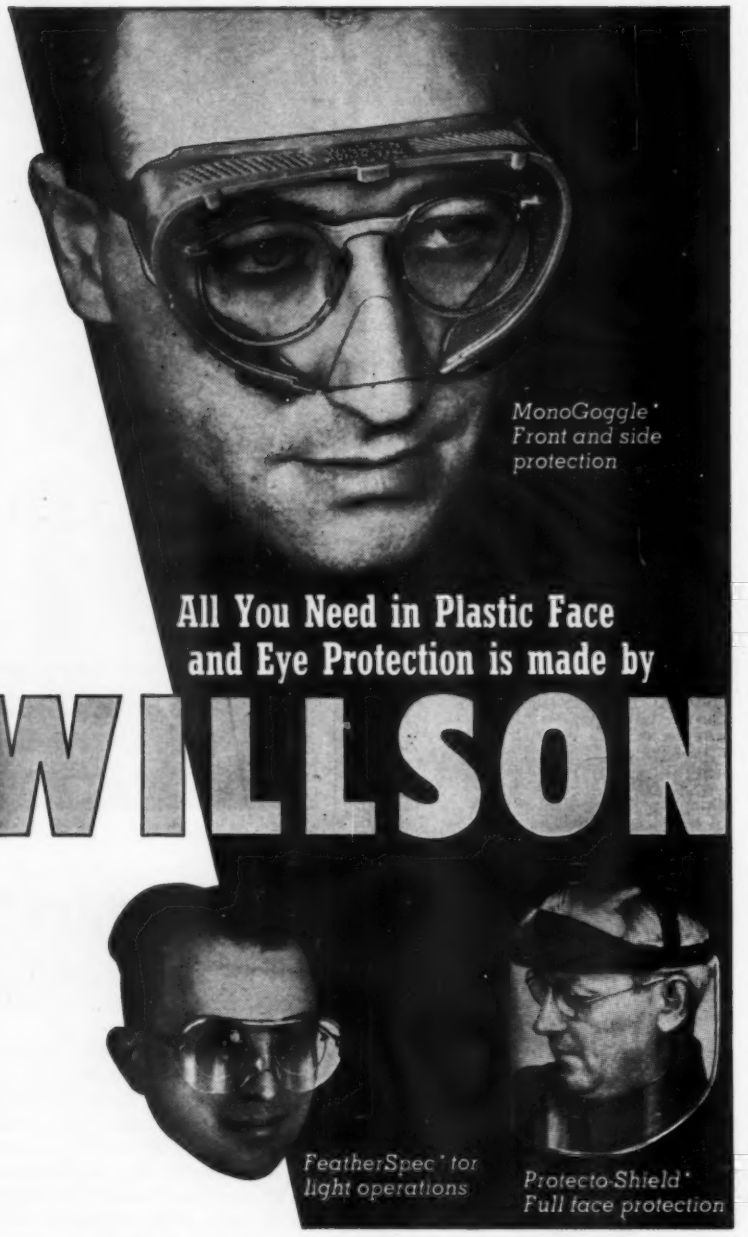
CANADIAN WILDCAT FAILURES

Bailey-Selburn-Great Plains-Battlebend 1, LSD 2 30-40-10w4, TD 3,805 ft.

Seaboard-Meridian 1, LSD 6 3-79-26w4, TD 1,796 ft.

Canadian Delhi-Union-Picardville 1, LSD 11 26-58-27w4, TD 3,693 ft.

Shawnee Pete 1, LSD 6 3-45-21w4, TD 5,641 ft.



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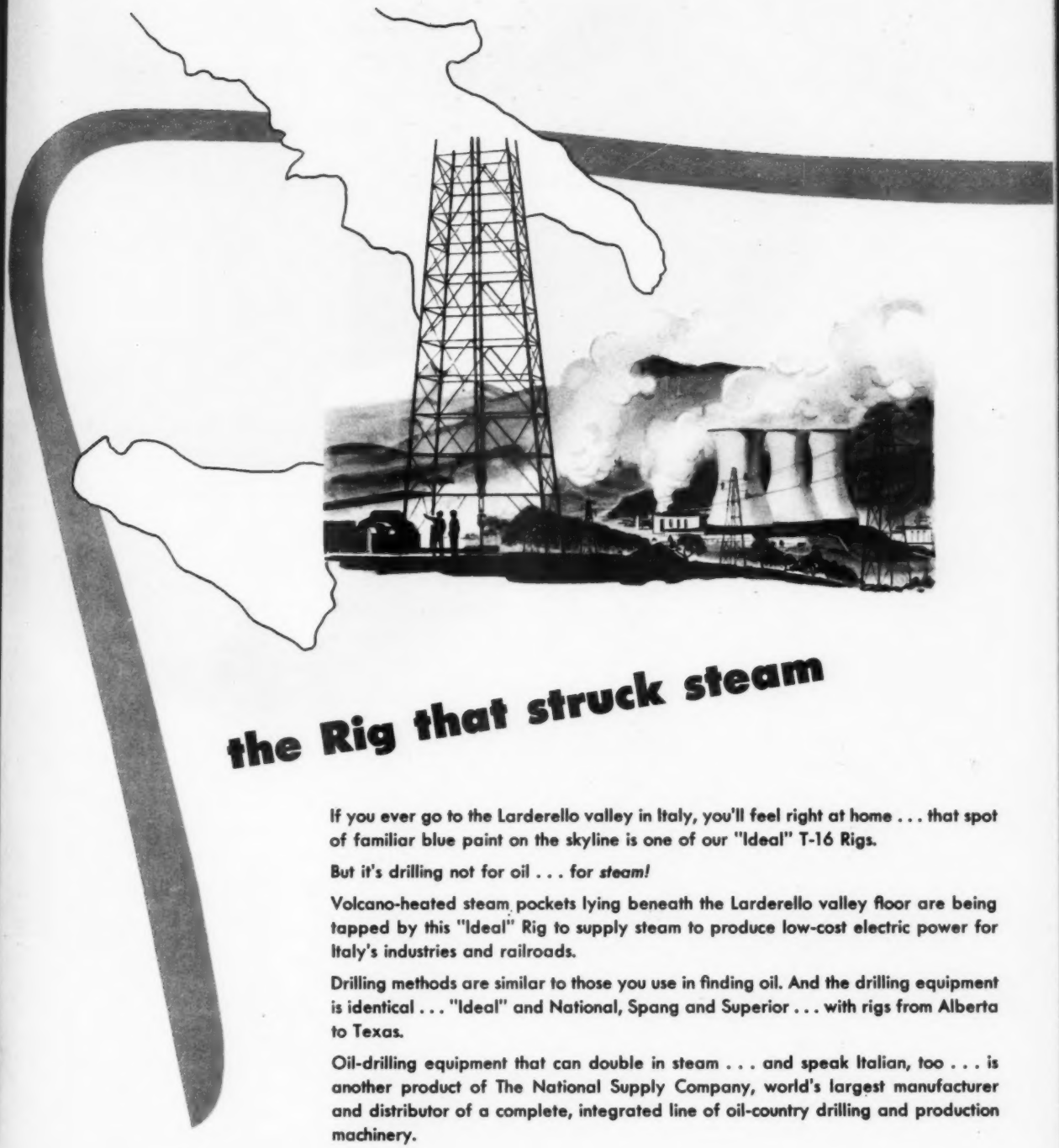
XUM



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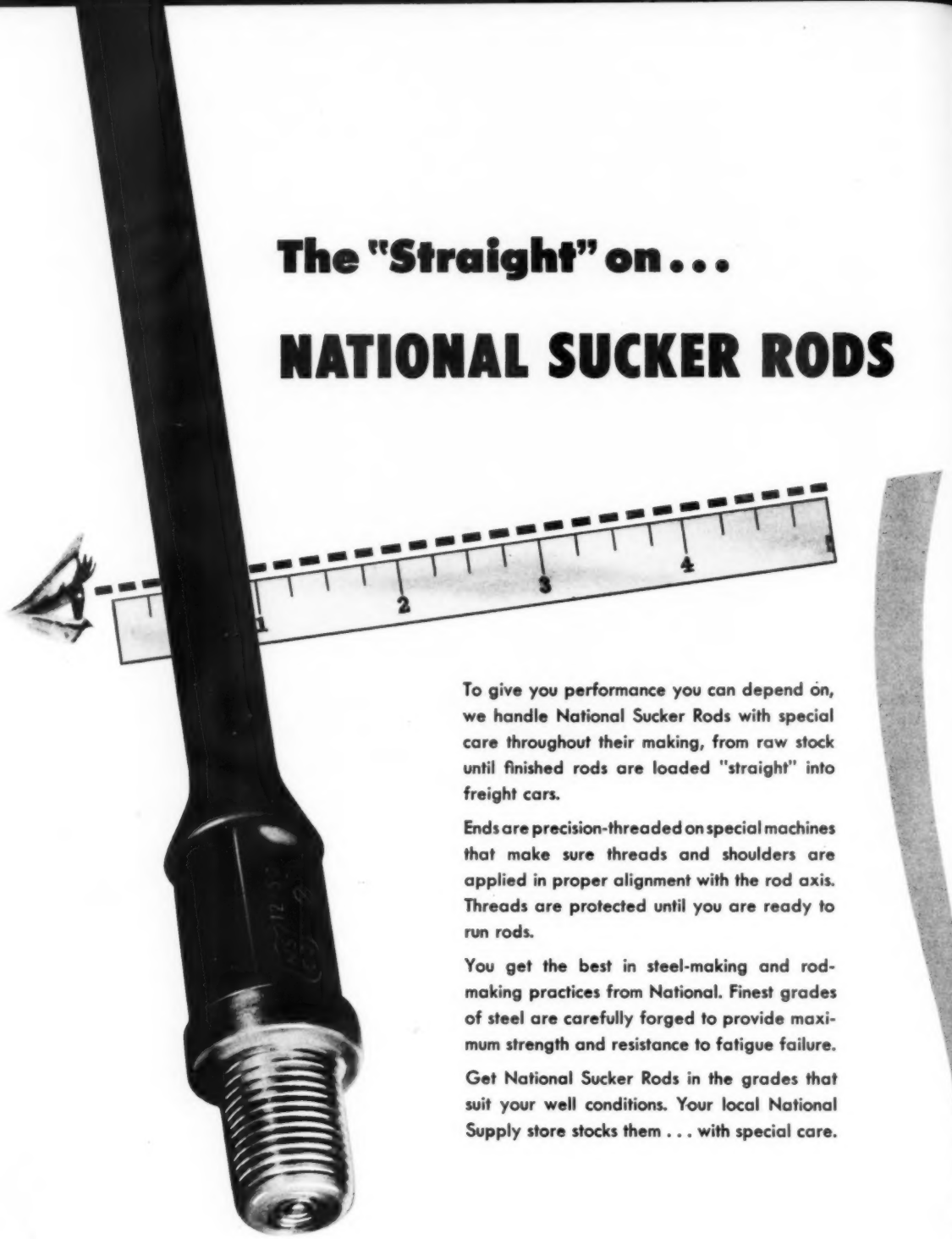

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Rocky Mountain

Activity Accelerated In Uinta Basin

DENVER.—California Co. has drilled plug and is preparing to test an apparent Tertiary discovery on the eastern side of the Uinta Basin in Utah. The well is 1 Unit, NE NE NE 26-7s-23e, in the Red Wash area, southeast of similar production in the Gusher-Roosevelt fields and west of Rangely field in Colorado. The well is at 5,270 ft., total depth, and casing was cemented after the operator recovered an estimated 4,000 ft. of light green oil, with high congealing point, on drill-stem test. The test was made between 5,249-70 ft. with tool open 1 hour. In coming out of the hole the well unloaded muddy oil as the fourteenth stand was pulled. The recovery was 480 ft. of gas-cut oil and 180 ft. of gas-cut water. Bottom-hole flowing pressure was 1,300-1,700 psi. Recovery of oil on this test has assured an active period for the eastern and southeastern Tertiary portions of this basin. Stanolind Oil & Gas Co., Sun Oil Co., Gulf Oil Corp., Texas Co., and others have holdings in the basin, and each of these has done seismic work through the area. The lease play began here 5 years ago, when Carter Oil Co. started a wildcat program which was continued despite costly failures. Carter and Stanolind made an important discovery in Roosevelt field, and have completed two wells in that field. Carter is now drilling three wildcats in the basin, with the Blue Bell test at 1 Unit, C SW NE 6-1s-2w, Duchesne County, now below 11,500 ft. This well, another joint operation with Stanolind, has had numerous shows but none have shown the commercial possibilities developed at Roosevelt. Carter is estimated to have more than 1,000,000 acres leased throughout the basin area. The play is of interest as it has found the first sizable oil production in Tertiary beds in the entire Rocky Mountain region, although there has been gas production from these sands for some time.

Kerr-McGee Oil Industries, Inc., and Stanolind Oil & Gas Co. are testing their discovery in the Meade area, Banner County, Nebraska, after running casing to the top of the "J" sand at 5,880 ft. The well is 1 Downer, NE NE SE 6-18n-55w, a wildcat 75 miles northwest of previous production in this portion of the Denver-Julesburg basin. It made 4,200 ft. of 40°-gravity oil on 1-hour test of the sand between 5,880-5,907 ft., total depth. An extensive land play has developed through Banner, Scottsbluff and Morrill counties, north and east of the new discovery, as a result of this test. East of the Meade wildcat British-American Oil Producing Co. is now coring in the "J" sand after failing to find production in the "D" sand of the Graneros series. Some shows have been encountered but the operator has made only one drill-stem test, which failed. The British-American well is 1 Crantz, SW SW NW 28-18n-53w, in the Johnson-Gill area.

In the Big Springs gas area, Deuel County, Nebraska, Pioneer Oil Corp. is drilling 1 Carson, SE NW NW 27-13n-43w, a north extension to "D" sand production.

WYOMING WILDCAT FAILURE

Carlisle, Crook County: Northern Ordnance 1 Somers, C SW NW 25-52n-67w, TD 2,351 ft., dry, red beds 800 ft., Minnekahta 1,443 ft., Minnelusa 1,540 ft., Madison 2,345 ft.

COLORADO WILDCAT FAILURES

Dove Creek, Delores County: W. Hawkins 1 Federal, C NE NW 13-39n-20w, TD 6,502 ft., dry, Shinarump 2,710 ft., Rico 4,645 ft., Paradox 6,035 ft.

West Merino, Logan County: Clark Drilling-Bay Petroleum Co. 1 Pellegrin, SE NW NW 28-6n-54w, TD 5,069 ft., dry, Muddy 4,913 ft., Dakota 4,997 ft.

Excelsior Divide, Mesa County: Carl Losey 1 Hynes, NW NW SW 24-2n-3w, TD 1,847 ft., dry.

Grand Junction, Mesa County: Granmesa Petroleum Co. 1 Riley, NW NW NW 27-1n-2w (UMP), TD 500 ft., dry.

Hollyoke, Phillips County: Ryan Oil Co. 1 Richard Means, SW SW SW 9-7n-45w, TD 3,983 ft., dry, Niobrara 2,550 ft., Timpas 2,900 ft., Codell 3,100 ft., Greenhorn 3,144 ft., "D" sand 3,380 ft., "J" sand 3,450 ft., "M" sand 3,700 ft., "O" sand 3,800 ft., Morrison 3,930 ft.

Cottonwood, Weld County: C. S. Atchison 1 Reagan, NE NE SE 11-10n-56w, TD 6,312 ft., dry, Niobrara 4,914 ft., Muddy 5,756 ft., Dakota 5,840 ft., Lakota 6,106 ft., Morrison 6,170 ft.

NORTHERN NEW MEXICO SUCCESSFUL WILDCAT

Table Mesa, San Juan County: Continental Oil Co. 17 well, SE SE SW 3-27n-17w, TD 7,761 ft., flowed 190 bbl. of 52°-gravity oil per day, 7-in. csg. 7,761 ft., Molas 7,335 ft., Ouray lime 7,398 ft., Elbert 7,595 ft.

NEBRASKA WILDCAT FAILURE

West Huntsman, Cheyenne County: Baxter Drilling Co. 1 Fine, SE SE NE 18-14n-50w, TD 4,887 ft., dry, Niobrara 3,888 ft., Ft. Hays 4,155 ft., Codell 4,298 ft., Greenhorn 4,390 ft., "D" sand 4,610 ft., "G" sand 4,720 ft., "J" sand 4,804 ft.

Louisiana-Arkansas

Ada Gas Area Gets Second Oil Well

SHREVEPORT.—Ada gas field of Webster and Bienville parishes got its second oil producer when Carter Oil Co. completed

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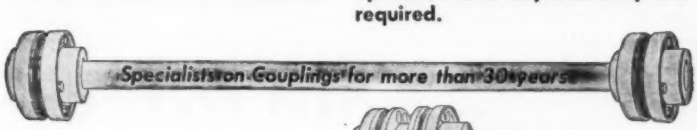

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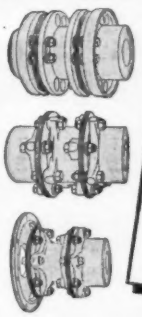

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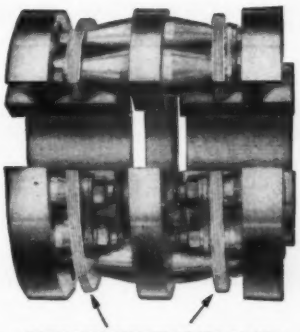

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the 1 Bates-Burson for 177 bbl. of 33.7°-gravity oil. Located in Section 2-17n-8w, Bienville Parish, the well flowed through 12/64-in. choke from the interval at 5,324-35 ft. in anhydrite stringer. Gas-oil ratio was 450:1; tubing pressure was 475 psi.; 7-in. casing was set to 5,418 ft. The field got its first oil well in 1948, when Carter brought in the 1 Daisy Woodward, 2-17n-18w, also in the Bienville Parish portion of the area.

Logansport field, DeSoto Parish, received a good well. Lyons, Prentiss & McCord 1 Alston unit, 23-11n-16w, had an open flow potential of 21,000,000 cu. ft. of gas per day. Production was from the Rodessa at 4,872-82 ft., where the casing was perforated with 60 holes. Total depth is 4,883 ft.

Plymouth Oil Co. 1 Webb, 4-16n-13w, near old Cedar Grove gas area, is drilling around 4,565 ft. This Caddo Parish wildcat is scheduled to go to 6,000 ft. In the same parish, Gulf Refining Co. is coring at 7,350 ft. at the 279-N Caddo Levee Board, a Cotton Valley test in Section 11-20s-16w.

East Haynesville is credited with two new wells, one oil and one gas-distillate. Stanolind Oil & Gas Co. 1 Meadows unit flowed 135 bbl. of 58°-gravity distillate plus 1,782,000 cu. ft. of gas per day from a Smackover limestone zone. Completion was through open hole at 10,430-10,686 ft. The new producer is located in 29-23n-7w, Claiborne Parish. Midstates Oil Corp. 1 Ed White, Section 16-23n-7w, pumped 50 bbl. of 44.3°-gravity oil from Birdsong-Owens sand, in the same field.

NORTH LOUISIANA WILDCAT FAILURES

Concordia Parish: R. A. Campbell 1-A Learned-Metcalf, 35-8n-8e, dry, TD 6,217 ft., elev. 64 ft., Sparta 2,496 ft, Cane River 3,365 ft., Talahatta 3,670 ft., Wilcox 3,779 ft.

R. A. Campbell 1-B Learned-Metcalf, 44-8n-9e, dry, TD 6,208 ft., elev. 62 ft., Sparta 2,324 ft., Cane River 3,192 ft., Talahatta 3,498 ft., Wilcox 3,613 ft.

DeSoto Parish: Monarch Petroleum Co. 1 Crowley, 29-13n-13w, dry, TD 3,051 ft.

ARKANSAS SUCCESSFUL WILDCAT

Union County: New pool, Ramsey Creek—Roberts Petroleum Co., Inc. 1 Ramsey, 23-17s-14w, TD 2,908 ft., pumped 140 bbl. 18°-gravity oil per day from perfs. in Travis Peak at 2,900-04 ft.

ARKANSAS WILDCAT FAILURES

Cleveland County: W. M. Coats 1 J. L. Moore, 3-9s-10w, dry, TD 4,086 ft., Paleozoic 4,050 ft.

Crittenden County: J. S. Patteson, Jr. 2 Magness, 25-8n-6e, dry, TD 3,260 ft., no tops reported.

Nevada County: Arkoma Oil Co. 1 Brantley, 24-14s-23w, dry, TD 3,814 ft., elev. 353 ft., Arkadelphia 925 ft., Nacatoch 1,065 ft., Tokio 2,142 ft., massive anhydrite 2,607 ft., Kilpatrick 2,750 ft., base James 3,234 ft., Sligo 3,388 ft., Travis Peak 3,480 ft.

California

Increased Demand Spurs Development Activity

LOS ANGELES.—Increased demand and higher postings for lower gravity crudes are having their effects on development activity in several California heavy-oil fields. Kern River and Kern Front, in San Joaquin Valley region, and San Ardo and Tapo Canyon in the Coastal area, are good examples. Last year they had practically no activity but in recent weeks all have a few completions to their credit.

In addition to its very low grade of crude, the San Ardo field in Salinas Valley has had the added handicap of inadequate transportation facilities. Discovered in 1948 some 35 wells were drilled there before the heavy-crude market broke in 1949 and development work was abandoned. Most of last year the field was shut in.

Before long, however, this shortcoming will be remedied. General Petroleum Corp. has announced it will move its inactive Lebec-Mojave line to the field. The company will purchase production of North American Consolidated Oil Co. and Jergins Oil Co., principal producers in the area.

In their exploratory activities, California operators are having but little success despite greater efforts. In Cuyama Valley, about 3½ miles southwest of Morales Canyon, Richfield Oil Corp. has abandoned its A-2 DeKoch at 1,603 ft. In the southern portion of the valley, in 30-10n-26w, the same company also suspended its 18-30 F. K. Perkins upon reaching 2,772 ft.

At Stone Corrall in 26-28s-19e, Kern County, Shell Oil Co. abandoned its 1 Security after some 2 weeks of testing horizons above the plugged-back depth of 5,215 ft. In the Manka anticline area of Solano County, Sunray Oil Corp. likewise has abandoned its Manka Community in 4-5n-2w. Drilled to 6,975 ft., a formation test at 6,847-6,971 ft. yielded only drilling mud.

New wildcats announced included a 6,000-ft. test in the Curry Mountain area of Fresno County, to be drilled by Signal Oil & Gas Co. It will be the 1 Signal-Camino, in NE NE 31-21s-15e, or about 2 miles southwest of Jacalitos field, and will be carried to the Cretaceous.

In Los Angeles County, Texas Co. has staked its 1 Puente in the Puente nose area, in projected 5-2s-10w. At Lopez Canyon, about 3 miles east of San Fernando in 36-3n-15w, Terminal Drilling Co. will drill its 1 Floyd, a 2,500-ft. test.

Humble Oil & Refining Co. staked location for its Pleito Creek test in Kern County, placing it in 35-11n-21w. The wildcat, located about 4 miles southwest of Wheeler Ridge production, will be known as its B-1 Kern County Land Co.

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CALIFORNIA WILDCAT FAILURES

Kern County, Stone Corral area: Shell Oil Co. 1 Security, 26-28s-19e, dry, TD 5,500 ft., elev. 494 ft.

East Tejon Hills area: Tejon Basin Oil Co. 1 Well, 13-11n-18w, dry, TD 732 ft., elev. 1,126 ft.

Tunis Creek area: Reserve Oil & Gas Co. 25-28 Reserve, 28-11n-18w, dry, top Santa Margarita 407 ft., TD 476 ft., elev. 923 ft.

Riverside County, Indio area: C. H. S. Co., Ltd., 1 Bobbie, 11-5s-7e, dry, TD 1,865 ft.

San Luis Obispo County, Cuyama Valley area: Richfield Oil Corp. A-2 DeKoch, 18A-11n-28w, dry, TD 1,603 ft., elev. 1,609 ft.

Solano County, Manka anticline area: Sunray Oil Corp. 1 Manka Community, 4-5n-2w, dry, TD 6,975 ft., elev. 200 ft.

Illinois-Ind.-Ky.

Clay County, Indiana, Gets First Production

FIRST oil production in Clay County, Indiana, is being opened by Clark County Research, Inc., at its 1 Long, SE SW SW 23-11n-7w, which swabbed at the rate of 40 bbl. of oil per day in preliminary tests following an initial treatment with 500 gal. of acid. Production is from Devonian lime at 1,480-96 ft.

Location of the well is about 1½ miles northwest of Saline City and about 10 miles south of Brazil. Nearest other production is about 8 miles to the west in the Riley pool, Vigo County. There is no production in the adjoining counties to the east and north.

Discovery of another new producing area, located about 4½ miles southwest of Olney, Richland County, Illinois, is indicated by drill-stem tests of saturation found in Rosiclare lime at Mark Twain Oil Producing Co. 1 Bialaschke, NE NW NE 23-3n-9e. In a 60-minute test taking in an interval at 3,005-25 ft., the well flowed gas within 2½ minutes and clean oil within 31 minutes after the tester was opened. Saturation was logged at 3,010-15 ft. With casing run to the top of the pay, cable tools are being moved in for completion. The new well is about a mile from nearest production.

A new Devonian lime pool has been opened in Clark County, Illinois, with the completion by A. J. Slagter of his 1 Murphy, SE NE SE 30-11n-11w, 1½ miles southeast of Marshall. The Devonian pay was logged at 2,023-50 ft. Hole, drilled to 2,084 ft. and plugged back to 2,050 ft., is open below 2,022 ft. The discovery is 6 miles from any other production.

Illinois Mid-Continent Co. has completed its 1 Jones, SW SE SE 23-2s-9e, to establish the first Benoist sand production in Wayne County, Illinois. The well is in the comparatively new Ellery West pool, 2 miles southeast of Goldengate, which produces from the Lower O'Hara and Rosiclare horizons. The well pumped 108 bbl. of oil per day at completion. The Benoist pay is at 3,108-16 ft. to which zone the hole was plugged from a total depth of 3,392 ft. The pool was opened last August.

ILLINOIS SUCCESSFUL WILDCAT

Clark County: A. J. Slagter 1 Murphy, SE NE SE 30-11n-11w, IP 32 bbl., Devonian 2,023-50 ft., TD 2,084 ft. (opens new pool).

ILLINOIS WILDCAT FAILURES

Bond County: H. L. Newlin 1 Elam, NW NW NE 20-6n-2w, dry, TD 1,246 ft.

Clark County: Lynn Oil & Gas Co. 1 English, NW SE SE 27-10n-12w, dry, TD 2,700 ft.

Clinton County: Davis & Johnson 1 Schmidt, SW SW SW 30-3n-3w, dry, TD 2,411 ft.

Gallatin County: Oil Management, Inc. 1 Hall Estate, SE SE NW 13-9s-8e, dry, TD 2,085 ft.

Lawrence County: Harper & Watson 1 White, SW SW NE 8-4n-10w, dry, TD 1,116 ft.

Madison County: George Cassens 2 Engelke, NW SE NE 1-5n-7w, dry, TD 812 ft.

Edgar White 1 Gertner, NE NW SW 5-5n-6w, dry, TD 569 ft.

Richland County: Joe Bander et al 1 Dresser, NW SW NW 1-3n-9e, dry, TD 3,000 ft.

Saline County: Aurora Gasoline Co. 1 Neighbors, NW NE SE 30-7s-5e, dry, TD 3,293 ft.

INDIANA WILDCAT FAILURES

Gibson County: C. E. Nickins 1 Tichenor, SW SW NW 20-2s-11w, dry, TD 2,385 ft.

Sullivan County: C. Johnson 1 Wilkey, N½ SW NW SE 24-8n-10w, dry, TD 1,699 ft.

Vigo County: J. W. Shakespeare 1 Milner, SW SE NW 9-12n-8w, dry, TD 1,659 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Daviess County: Ellis-Morrison and Damron & Gary 1 O'Brien, N½ NE NW SW 13-O-27, dry, TD 2,316 ft.

EASTERN KENTUCKY

ASHLAND.—In Rowan County, 3-T-72 and ½ mile north of Farmers, J. Frank Hinkle is drilling at 480 ft. on 1 D. C. Caudill, a wildcat in the western portion of the county.

In Bath County, 7-T-71, Victor Knudson is drilling at 320 ft. on 1 John Meadows, a wildcat test 2 miles north of old production in Salt Lick pool. Operators will likely test the upper part of the Ordovician.

In Elliott County, Isonville pool, Smith Bradley et al. have completed 6 Add Lewis for 5 bbl. oil daily from the Weir (Mississippian) sand at a total depth of 1,000 ft.

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THE OIL AND GAS JOURNAL

"Maybe you better run down and see what's what—this is the field report I got in the morning mail!"

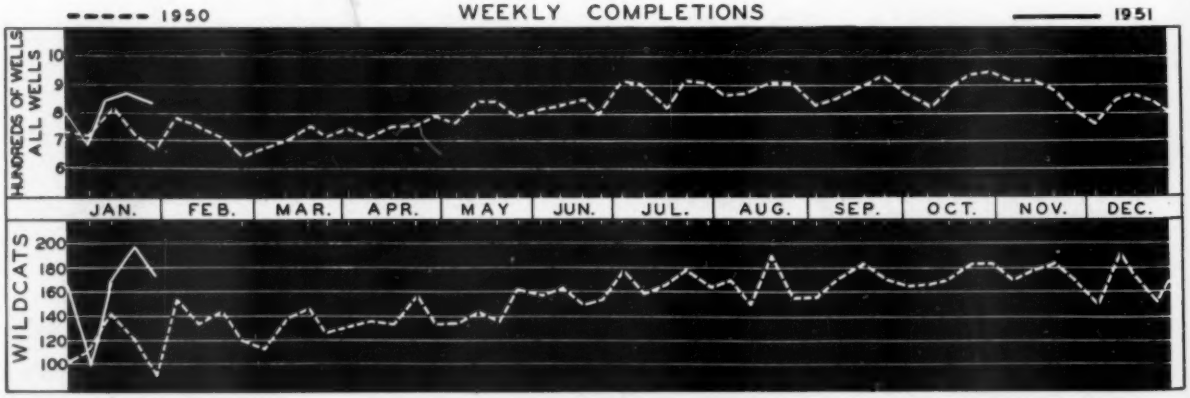
CURRENT STATISTICS

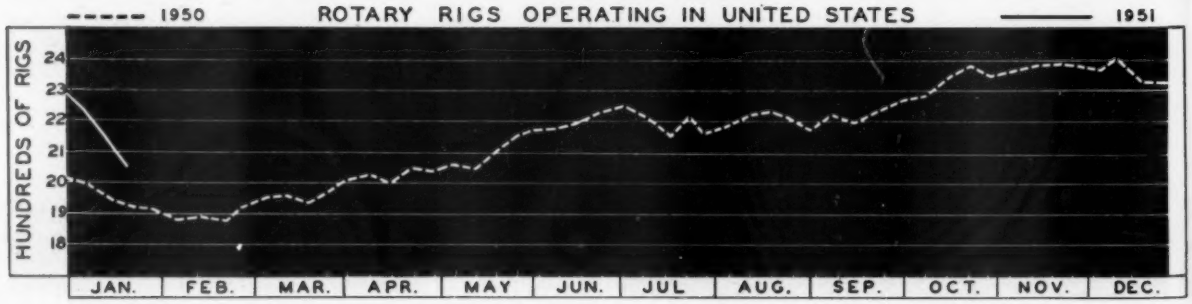
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 27, 1951

	Total of all wells					Jan. 27		Wildcat completions and discoveries									
													Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	8	4	0	*4	11,570	34	58	0	0	0	0	0	0	0	0	0	0
Pennsylvania	17	6	5	†6	41,379	67	91	0	0	0	0	0	0	0	0	1	1
West Virginia	16	1	12	3	44,376	52	45	0	0	2	0	2	0	0	2	1	3
Ohio	18	9	3	‡6	39,981	65	65	0	0	0	1	1	0	0	0	4	4
Indiana	27	11	2	14	46,771	100	79	0	0	0	3	3	1	0	0	11	12
Kentucky	15	6	4	5	29,333	82	74	0	0	0	1	1	1	0	0	13	14
Illinois	41	18	1	‡22	88,821	183	191	1	0	0	9	10	3	0	0	30	33
Michigan	15	7	1	7	37,343	50	65	0	0	1	4	5	0	0	1	20	21
Kansas	88	43	4	41	286,863	319	222	4	0	0	14	18	13	0	1	56	70
Nebraska	15	11	0	4	40,776	28	6	0	0	0	4	4	0	0	1	11	12
Oklahoma	108	56	5	47	426,832	446	339	4	0	0	18	22	23	0	3	65	91
Texas	346	221	4	121	1,491,525	1,305	1,120	18	1	1	62	82	49	6	9	205	269
North Central (Dist. 7-B & 9)	103	43	0	160	298,873	374	314	11	0	0	29	40	22	0	0	84	106
West (Dist. 7-C & 8)	103	86	0	17	563,879	370	282	4	0	0	11	15	9	0	0	36	45
Panhandle (Dist. 10)	15	11	1	3	55,939	60	112	0	0	0	2	2	0	0	0	4	4
Eastern (Dist. 5, 6, & 6-P)	40	30	0	10	192,343	102	91	0	0	0	4	4	0	0	0	14	14
Gulf Coast (Dist. 2 & 3)	30	20	1	9	166,536	207	161	1	0	1	2	4	12	5	8	28	53
Southwest (Dist. 1 & 4)	55	31	2	22	213,955	192	160	2	1	0	14	17	6	1	1	39	47
Louisiana	38	23	0	15	262,278	176	217	0	0	0	3	3	2	0	0	22	24
Northern	16	8	0	8	69,723	88	114	0	0	0	3	3	0	0	0	12	12
Southern	22	15	0	7	192,555	88	103	0	0	0	0	0	2	0	0	10	12
Arkansas	13	7	1	5	49,733	42	31	1	0	0	3	4	1	0	0	9	10
Mississippi	2	1	0	1	14,523	16	25	0	1	0	1	2	2	1	0	3	6
Southeastern States	1	1	0	0	3,400	7	4	0	0	0	0	0	0	0	0	2	2
Montana	0	0	0	0	0	14	16	0	0	0	0	0	0	0	0	1	1
Wyoming	14	8	1	5	76,614	53	57	0	0	0	1	1	1	0	0	11	12
Colorado-Utah	9	1	0	8	32,075	23	15	0	0	0	6	6	0	0	0	12	12
New Mexico	10	6	2	2	42,732	47	51	1	0	0	1	2	1	0	3	7	11
California	34	26	0	8	112,137	123	137	0	0	0	6	6	3	0	0	26	29
Miscellaneous (Md.)	2	0	2	0	7,275	3	1	0	0	2	0	2	0	0	2	1	3
Total United States	837	466	47	324	3,186,337	3,235	2,909	29	2	6	137	174	100	7	22	511	640
Total previous week	873	505	50	318	3,521,197	....	....	28	5	6	158	197	71	5	16	374	466
Total January 27, 1950	662	377	44	241	2,626,201	....	....	9	2	1	80	92	72	7	17	370	466

Service wells included: *4, †5, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 27 crude oil	B. of M. Jan. demand	Jan. 20 crude oil
Alabama	2,800	2,400	2,750
Arkansas	79,600	88,000	79,550
California	965,300	960,000	963,200
Colorado	81,400	68,000	73,100
Eastern	61,050	67,000	60,750
Florida	1,615	1,600	1,525
Illinois	165,800	176,000	162,400
Indiana	28,700	31,000	28,500
Kansas	321,550	301,000	316,700
Kentucky	29,100	31,000	30,300
Louisiana	595,675	612,000	595,675
North Louisiana	116,400	.....	116,400
South Louisiana	479,275	.....	479,275
Michigan	43,300	47,000	45,100
Mississippi	105,000	114,000	98,950
Montana	22,200	23,000	22,100
Nebraska	8,650	6,000	8,500
New Mexico	134,250	138,000	134,250
Oklahoma	499,800	470,000	491,900
Texas	2,658,700	2,395,000	2,658,700
Dist. 1 (Southwest)	33,250	.....	33,250
Dist. 2 (Southwest)	161,925	.....	161,925
Dist. 4 (Southwest)	249,075	.....	249,075
Dist. 3 (Gulf Coast)	471,675	.....	471,675
Dist. 5 (Eastern)	48,700	.....	48,700
Dist. 6 (Eastern)	107,025	.....	107,025
East Texas field	272,000	.....	272,000
Dist. 7-C (West)	81,200	.....	81,200
Dist. 8 (West)	898,250	.....	898,250
Dist. 7-B (W. Central)	81,000	.....	81,000
Dist. 9 (N. Central)	164,600	.....	164,600
Dist. 10 (Panhandle)	90,000	.....	90,000
Utah	3,200	4,000	3,200
Wyoming	181,500	180,000	181,900
Total United States	*5,989,190	5,715,000	5,962,050
Change from previous week, up	27,140		
Canada			105,370

Total U. S. production January 1-January 27 ... †166,177,375 bbl.
Same period last year (crude plus cond.) ..... 133,955,275 bbl.

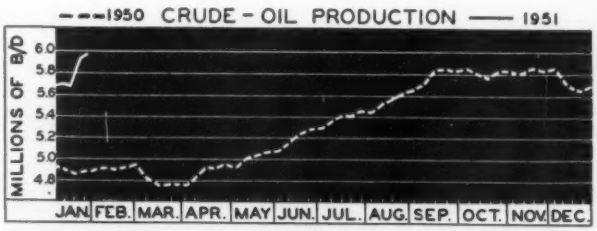
*Not including 104,250 bbl. condensate. †Including 2,766,120 bbl. condensate.

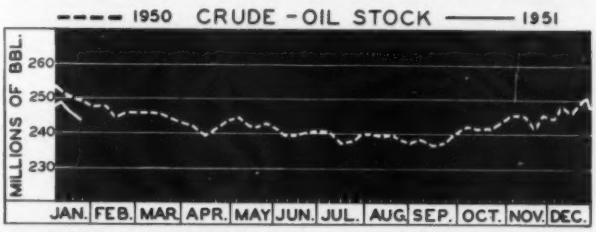
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

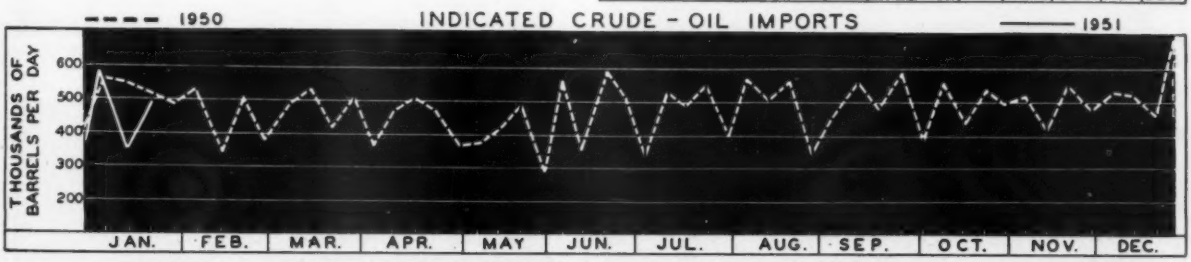
(Thousands of barrels daily)

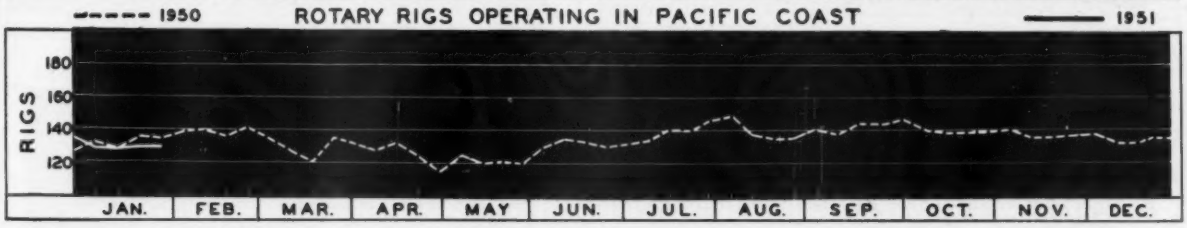
	Jan. 20, 1951	Jan. 13, 1951	Jan. 21, 1950
Pennsylvania Grade	2,079	2,088	2,731
Other Appalachian	1,145	1,249	1,760
Illinois, Indiana, Michigan	10,067	9,944	10,915
Arkansas	2,484	2,531	3,155
Louisiana	14,889	14,537	14,122
North	2,969	3,043	3,545
Gulf	11,920	11,494	10,577
Mississippi	3,632	2,869	2,488
New Mexico	6,965	7,261	7,343
Oklahoma and Kansas	38,021	38,605	36,874
Texas	114,216	116,640	111,567
East Texas	13,935	14,133	15,022
West Texas	45,204	46,131	40,419
Texas Gulf	27,628	27,819	29,603
Other Texas	27,449	28,557	26,523
Rocky Mountain	12,207	11,803	13,218
California	31,249	31,457	37,512
Foreign	6,290	6,735	7,439
Total	243,244	245,179	249,124

*Bureau of Mines.







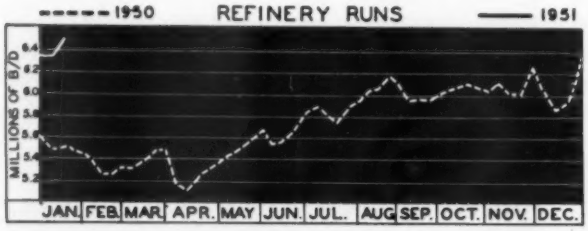


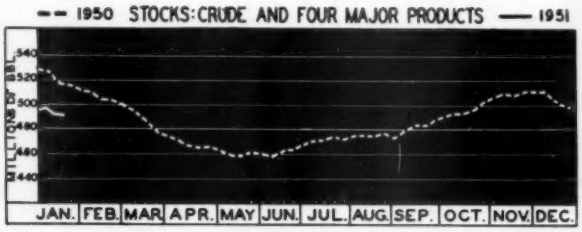
A.P.I. REFINERY REPORT, JANUARY 20

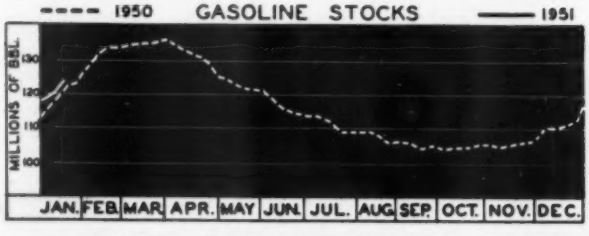
(Thousands of barrels)

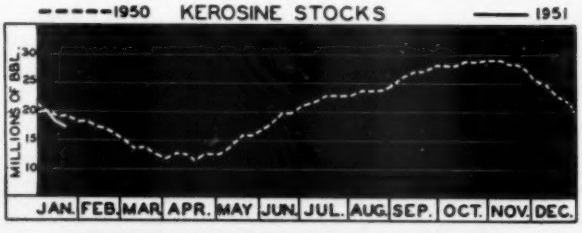
District—	Daily avg. crude runs	Daily average production				Stocks at refineries, bulk terminals, in transit and in pipe lines				Bureau of Mines, January 1950				
		Gasoline*	Kerosine	Distillate	Residual	Gasoline†	Kerosine	Distillate	Residual	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,021	386.1	52.8	256.0	252.1	23,994	6,979	17,707	9,371	853	349.1	40.3	184.1	209.3
Appalachian:														
District 1	98	43.4	5.3	15.9	11.4	2,826	301	582	304	94	40.8	7.4	13.8	12.2
District 2	71	29.6	6.1	8.1	26.9	1,138	136	81	131	69	32.1	5.1	8.6	16.1
Ind., Ill., Ky.	1,182	601.4	74.8	231.3	186.3	26,390	3,705	8,059	3,159	1,001	508.4	72.5	172.1	176.4
Okla., Kans., Mo.	554	286.4	21.3	131.4	66.1	12,977	816	7,472	1,101	448	253.7	20.1	88.8	60.0
Inland Texas	203	149.6	11.6	26.1	36.4	3,992	396	844	572	194	133.2	13.1	25.2	37.6
Texas Gulf Coast	1,604	685.2	153.6	392.4	285.0	20,900	2,376	10,694	5,366	1,270	578.5	111.9	373.8	242.1
La. Gulf Coast	505	214.2	64.6	106.6	65.7	8,218	1,204	3,183	2,030	447	207.7	63.3	97.5	51.7
N. La. and Ark.	78	29.0	8.9	18.9	8.6	2,815	249	871	106	68	28.7	7.2	11.8	13.6
Rocky Mountain:														
New Mexico	15	7.7	0.4	2.9	2.9	111	25	65	30	13	7.6	0.5	2.0	3.3
Other Rocky Mtn.	209	97.0	8.6	36.6	48.1	3,960	244	1,472	765	174	83.8	6.6	31.8	40.6
California	965	431.0	10.0	109.8	387.2	16,461	746	10,117	18,275	852	351.7	11.4	138.5	346.5
January 20, 1951	6,505	2,960.6	418.0	1,338.0	1,376.7	123,782	17,177	61,147	41,210	5,483	2,575.3	359.4	1,048.0	1,209.4
January 13, 1951	6,370	2,973.6	378.9	1,437.4	1,398.0	121,209	18,027	64,557	41,675	.....	.....	.....	.....	.....
January 21, 1950	5,513	2,569.7	380.4	1,068.9	1,180.9	122,204	19,046	69,214	58,585	.....	.....	.....	.....	.....

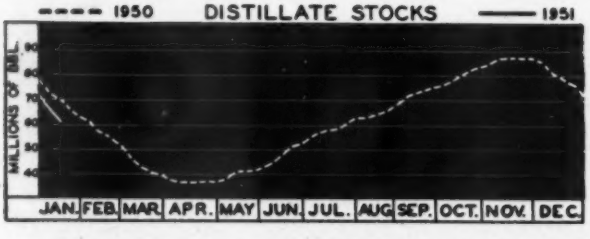
*At refineries including natural blended. †Finished and unfinished.

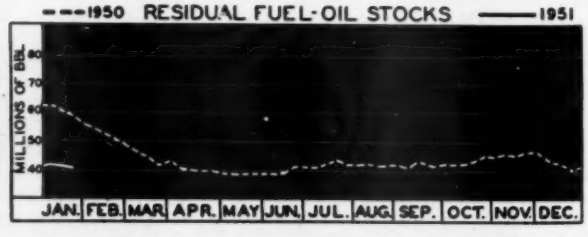


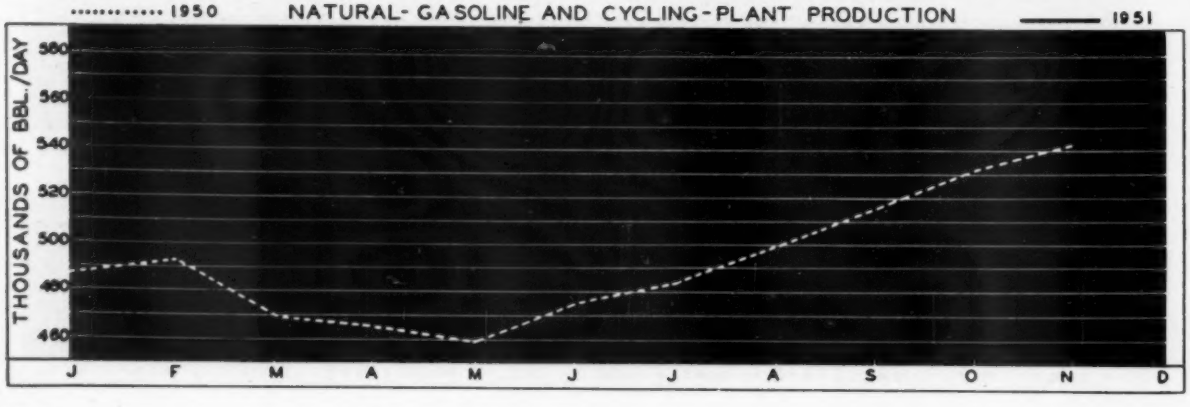












CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

RESIDUAL-FUEL prices on the East Coast are unchanged despite rumors of increases that have persisted for the past month. Wage increases and other concessions to coal miners have added to coal-production costs, and observers have predicted a rise in coal prices to cover at least a part of these increases in cost. Estimates of the price increase range from 30 cents to 50 cents a ton.

The average wholesale price of run-of-the-mine coal at New York Harbor for November was $9.67 a ton, according to report by the Bureau of Labor Statistics. On a heat-equivalent basis, parity for heavy fuel would be about $2.20 a barrel. The low of postings for residual with no sulfur guarantee is $2.15 and $2.25 for fuel with less than 1 per cent sulfur.

An increase of 50 cents a ton in the price of coal would raise the parity for fuel only to about $2.32 a barrel or about 17 cents above the low of current postings. On the other hand, it would take an increase of about $1 a barrel to restore the balance between Gulf Coast prices and barge prices in New York Harbor.

Coastwise tanker rates have increased more than 350 per cent since last May. Latest reports show rates for dirty vessels at Maritime Commission base plus 200 per cent and for clean vessels at MC plus 210 per cent. Some material moved in May 1950 at MC less 35 per cent. The current rate amounts to about $1.32 a barrel for residual compared with about 28 cents last May.

Much of the residual is moving in company-owned vessels or vessels under long-term charter, but the trend in spot rates indicates that these companies will have to pay much higher rates for time-charter vessels at the end of present contracts. Transportation costs have not reached the peak.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of January 29, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11½	13.5-13.75	11½-12
42-44 w.w. kerosine	9¼-9⅜	10-10.1	8¾-9
No. 2 straw fuel oil	8⅜-8⅝	9-9.25	7¾-8
No. 6 residual	$1.80-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La
Grade 26-70	6⅞	6⅜	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

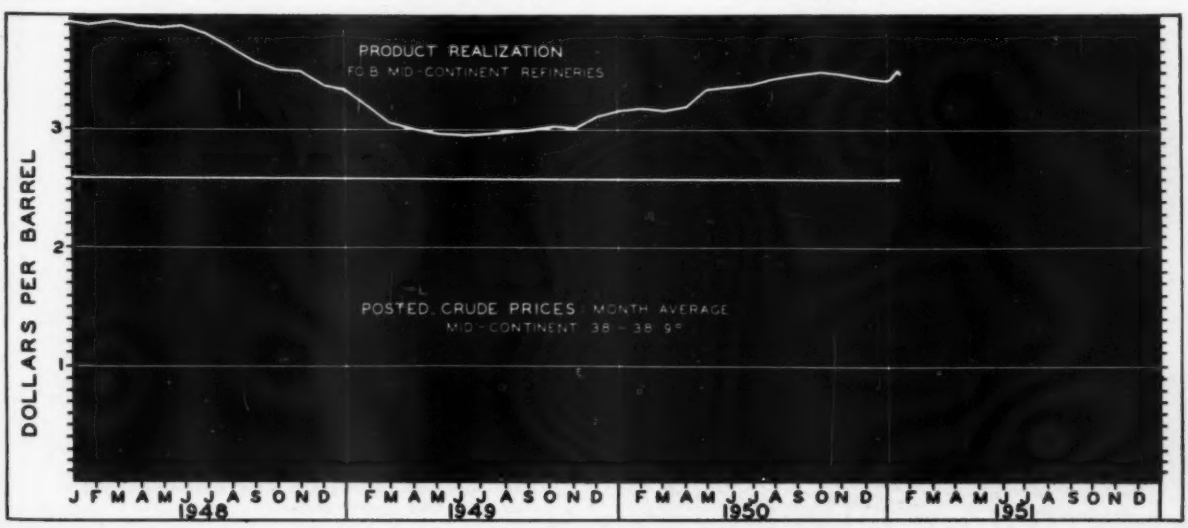
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.0


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.51 for week ended January 20, $3.56 for previous week, and $3.19 for January 1950.

SIMPLE, SAFE, ACCURATE FLOW MEASUREMENT

WITH

AITKEN MICRO-meter TUBES

AND

ROBINSON ORIFICE FITTINGS

The Robinson Fitting operates efficiently in any position allowing the most economical installation. The ease of operation means a saving in man-hours and increased safety not found in less efficient flow measurement systems. In changing plates, the Plate Carrier need not be lifted manually, eliminating the danger of dropping it. There is no leakage hazard when changing plates, as the fitting is provided with a built-in lubricated plug valve which divides the upper and lower chambers. This arrangement eliminates the necessity for constructing any by-pass lines which always require several expensive and often troublesome valves. Bringing the orifice plates out of the side of the Fitting saves installation space and head room and, in addition, is much more convenient for the operator.

Whatever your flow measurement problem is, you can rely on this engineered combination for the best in long life and the best in proved, accurate measurement. Complete stocks available in Houston.

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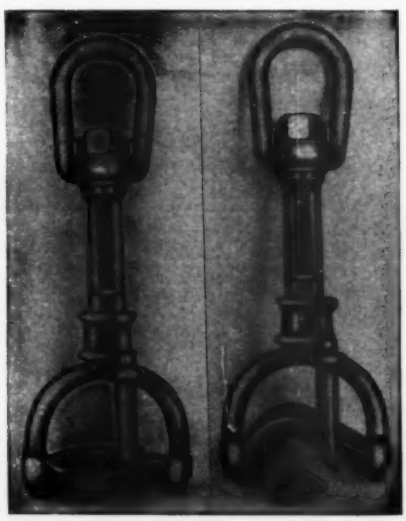
TULSA, OKLAHOMA

NORRIS BROTHERS IMPROVED SAFETY SUCKER ROD ELEVATOR



Handiest and safest elevator on the market. Forged steel body and high carbon alloy steel forged jaw. Buy from your supply dealer.

NORRIS BROTHERS, INC.
ROBINSON, ILL.

EQUIPMENT MEN . . . in the News

Chicago & Southern Elects Miller as Vice President

The board of directors of Chicago & Southern Air Lines, during a recent meeting in Havana, Cuba, announced the election of Thomas H. Miller as vice president of traffic. Miller formerly was general traffic and sales manager.

Miller joined Chicago & Southern in October 1943 as assistant to the director of economic research and planning in the company's legal department. In 1945 he was named director of economic research and a year later appointed director of state relations and properties. He was made general traffic and sales manager in 1947.

Ruysser Made General Manager of BS&B Sales

H. A. RUYSSER

Appointment of Henry A. Ruysser, Jr., vice president, as general manager of sales of Black, Sivalls & Bryson, Inc., has been announced by Kenneth W. Lineberry, president.

Ruysser has been an officer and director of the 55-year-old manufacturer of oil-field equipment and steel products for the last 5 years.

After 2 years at Rockhurst College, Ruysser attended University of Detroit and graduated with a degree in chemical engineering. For a period of years, he was employed in engineering, research, and development at Ford Motor Co., Detroit.

As general manager of sales, Ruysser will be responsible for all sales, both domestic and foreign, and for advertising and sales promotion, embracing a sales organization of 225 persons.

Bethlehem Steel Unites Its Supply Branches

Bethlehem Steel Corp. has announced that Bethlehem Supply Co. of California will operate as an integral unit of Bethlehem Supply Co., whose headquarters are at Tulsa. This move will combine the operations of Bethlehem's oil-field supply activities under one management, and will result in a more unified effort in supplying the needs of the ever-expanding oil industry.

Bethlehem entered the oil-field supply business in 1937; since that time its supply operations have expanded to the extent that the present organization includes 50 field stores and 2 manufacturing plants located at Corsicana, Tex., and Tulsa. These plants produce a complete line of both drilling and production machinery. Bethlehem Supply Co. is represented in the export field by Bethlehem Steel Export Corp. located in New York.

Hodges Becomes Assistant Sales Manager at Dresser

S. B. HODGES

Hanford Z. Hight, sales manager, Dresser Manufacturing Division, Bradford, Pa., has announced the appointment of Stephen B. Hodges as assistant sales manager for the company. Hodges has been with Dresser for the past 18 months working on sales-promotion activities. Before coming with the company he was with Equitable Life Assurance Society and Trans-World Airline in New York City.

In his new capacity at Dresser, Hodges will concentrate on sales-promotional activities and improving customer services at the home office.

Dow Names McBurney to Service, Development Work

Wilbur G. McBurney, Jr., has been assigned to the technical service and development department of Dow Chemical Co. and will furnish liaison between the company and the petroleum industry. His headquarters will be in Midland, Mich.

McBurney joined the company in July 1950 and spent 6 months in plant familiarization. Previously he had been employed by Koppers Co., Inc., from April 1942 to May 1945 in the pilot plant and production operations, and in the research and development division of Socony-Vacuum Oil Co., Inc., Paulsboro, N. J., from March 1947 to June 1950. He was graduated from University of Pittsburgh in 1942 with a B.S. in chemical engineering.

Duff-Norton Advances Krueger in Sales Division

T. W. KRUEGER

Duff-Norton Manufacturing Co., Pittsburgh, has announced the appointment of T. W. Krueger as assistant general sales manager.

Krueger joined Duff-Norton in 1947 as advertising and sales promotion manager. In addition to his duties as assistant general sales manager, he will continue to direct advertising and sales-promotion activities. Prior to joining Duff-Norton he was associated with the advertising department of Jones & Laughlin Steel Corp.

Faris Made Export Sales Representative for Mission

R. L. FARIS

Mission Manufacturing Co., of Houston, has announced the appointment of R. L. (Jack) Faris as export sales representative with headquarters in New York City, succeeding Jeff Tucker.

Faris was raised in San Marcos, Tex., and spent the years from 1927 to 1937 in the oil fields. In 1937 he started selling oil-well drilling equipment, in which field he has had 14 years' experience.

Faris takes charge of Mission export sales in the company's silver-anniversary year, which began on December 6 and will be celebrated throughout 1951. Mission manufactures slush pump pistons, rods, valves, and packing, rolling dog slips, swabs, automatically lubricated plug valves, and centrifugal pumps.

Franks Service and Parts Branch Opened in Seminole

Franks Manufacturing Corp. has recently opened a new servicing and parts warehouse at Seminole, Okla., under the managership of Albert E. Hastings.

Stuart Corry, district sales manager for Franks in Oklahoma, will be in charge of the sales division in Franks new branch. The new shop will be completely stocked with parts to

XUM

cover maintenance and repairs of all Franks units in the area.

Included in the opening ceremonies was a barbecue and open house, to which were invited drilling contractors and oil-company production men. Franks officials present for the occasion were: Clair Simmons, vice president in charge of production; Art Knight, sales manager; Guy Rickey, warehouse superintendent; James Deal, production manager; and Mike Pallein, service shop foreman at the Tulsa plant.

Winstead Named General Sales Manager of Oilwell

K. B. WINSTEAD

Promotion of K. B. Winstead to general manager of sales for Oil Well Supply Co. has been announced by Lloyd E. Tracy, vice president in charge of sales.

Winstead, a veteran of 30 years' service with Oilwell, has served as assistant general manager of sales for the past 3 years. He succeeds M. F. Hazel who recently was appointed director of engineering for the supply firm.

In his new position Winstead will be responsible for coordinating sales activities of Oilwell's six domestic divisions and the export division, as well as directing the line organization of the general sales department.

Winstead joined Oilwell in 1921 as a stock-record clerk. He was located at Breckenridge, Tex., from 1923 to 1930, first as branch-store manager and later as district manager. He then served as district manager at Wichita Falls, Tex., and when the East Texas oil fields opened he was named district manager at Longview, Tex. He came to the Dallas headquarters in 1939 and was engaged in sales activities with the Midwest division until October 1943, when he became manager of that division. He was appointed manager of the newly created Central Midwest division in January 1946, and on January 1, 1948, he was elevated to assistant general manager for the company.

Wilson-Snyder Expands Centrifugal Pump Line

Wilson-Snyder Manufacturing Division of Oil Well Supply Co., a recognized pump manufacturer of long standing, soon will materially expand its line of centrifugal pumps, Fred F. Murray, president of this United States Steel subsidiary has announced. The Wilson-Snyder plant is located at Braddock, Pa.

The additional line includes 19 general-purpose centrifugal pumps ranging from 5 to 250 hp. of a type formerly manufactured by National Transit Pump & Machine Co. of Oil City, Pa., which liquidated all of its properties early this year. Wilson-Snyder is acquiring patterns, drawings, tools, testing equipment, and inventory for the centrifugal pumps which were formerly manufactured by National Transit.

The Braddock plant will immediately begin quoting on new pumps and will provide service on replacement parts for National Transit-manufactured centrifugal pumps now in service, Murray said.

Bethlehem, Tube Turn Executives Approve Agreement

Wendell M. Jones, vice president and general manager of Bethlehem Supply Co. of California, accepts congratulations from John G. Seiler, executive vice president of Tube Turns, Inc. Bethlehem Supply Co. was recently appointed a distributor of Tube-Turn fittings and flanges. J. W. Hollingsworth, general sales manager (left) and C. R. Zimmerman (right), executive vice president of Bethlehem Supply, look on with approval.

Clayton Made Geophysical Supervisor With Century

Century Geophysical Corp. has announced that Neal Clayton has taken the position of geophysical supervisor with Century. He will be directly associated with the supervision of Century field parties. Clayton received his A.B. degree in physics from Mississippi College in 1934. After a year of teaching, he enrolled at Louisiana State University, receiving his M.S. degree in 1937 while holding a teaching fellowship for 2 years. He began work on a seismic crew for Humble Oil & Refining Co. in the summer of 1936 and later worked in seismic crews in the United States and in Eastern Venezuela. Still later he was employed as computer, observer, and party chief by Seismic Explorations, Inc., Magnolia Petroleum Co., and North American Geophysical Co.

Clayton joined Republic Exploration Co. in February 1946 as supervisor of surface shooting.

Rockwell Acquires Pitcairn Valve, Fittings Branches

J. H. JUDGE

W. F. Rockwell, Jr., president of Rockwell Manufacturing Co., has announced the acquisition of both the Pittsburgh Valve and Fittings Division of Pitcairn Corp. and the Pittsburgh Valve & Fittings Corp., a subsidiary of Pitcairn Corp.

In another announcement A. J. Kerr, vice president in charge of sales for the Meter and Valve Division, Rockwell Manufacturing, named James H. Judge as sales manager of the company's gasoline, oil, and industrial meter line.

Rockwell paid approximately $3,000,000 for the assets acquired from Pitcairn. Manufacturing facilities and principal offices of Pittsburgh Valve are located at Barberton, Ohio, and warehouses are located in Kansas City and Houston. Included with the plant is a completely modern foundry for the manufacture of valve castings.

R. G. Caouette, at present general manager in charge of manufacturing for the Meter and Valve Division of Rockwell will become general manager of the Barberton property. J. A. Strachan, general manager of sales of Pittsburgh Valve will continue in that capacity as will all district managers.

Judge was formerly associated with Neptune Meter Co., serving successively as salesman, Chicago branch manager, and beginning in 1945, as assistant general sales manager, which position he held until recently.

(Continued on page 130)

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$12.00 a column inch one issue . . .
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EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE—One truck mounted Sullivan 200 Rotary Drilling Rig complete including 2,000 feet of new 2 and 7/8" drill pipe, drill collars, light plants, water pumps, dog house; three other trucks, one new 5 x 10 mud pump and motor operating as a separate unit. Box D-828, The Oil and Gas Journal, Tulsa, Oklahoma.

ONE Gardner-Denver Compressor Unit size 12 x 11 and 4¾ x 11, direct connected with 100 HP electric RPM motor, complete with all equipment; located at Refugio, Texas; in service forty-five days, Will take reasonable discount. Clymore Petroleum Corporation, 238 Kaffie Building, Corpus Christi, Texas.

3 USED Pressure Vessels, 6' x 20' overall Shell 1¼" steel, Dished Heads—1½" steel, Weight 24,800 lbs. each. American Pipe & Supply Co., 3403 Brighton Boulevard, Denver 5, Colorado.

FOR SALE: Emsco 129 foot jackknife derrick, 10 foot substructure. Excellent condition, used on only three wells. Two 6NKU Waukesha motors, never used. 215 joints 4½ inch drill pipe equipped with new Hughes counter weld bore 6 inch tool joints. One 50 foot U.S. 2½ inch rotary hose, 3 inch connections. For price write 525 Wichita National Bank Building, Wichita Falls, Texas.

FOR SALE: 1946 Cardwell QST Servicing unit with 48' 7"x8" Cardwell Mast. Suitable for 3500' 2⅛" tubing. Complete set tubing and rod tools. Mounted on 3-Ton EH Mack truck. Frank Jones, McPherson, Kansas.

CARDWELL Spudder, Model R-L, complete with mast, power, tools, doghouse, all ready to go. $14,000.00. E. E. Brook, 807 Colcord Bldg., Oklahoma City, or Phone L.D.231.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

FOR SALE TANK BATTERY

2—10 x 16 Welded Steel Tanks (with walkway)

1—16 x 20 Bolted Steel Tank (Galvanized)

1—125# National Separator (4' x 16½')

1—BS&B Volume Type Heater (25# w.p., 50# test)

Bankoff Pipe & Supply Co.
P. O. Box 2301 **Phone 6-2119**
Tulsa, Oklahoma

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE: 8,000'—2⅛ OD used seamless steel tubing. 40' lengths. Excellent condition. Price per foot 25 cents F.O.B. Joplin, Missouri. Joplin Machinery & Electric Company, Joplin, Missouri.

FOR SALE: Two Sullivan 37 special rigs mounted on International trucks, Waukesha and Buda drill motors, 1800 ft. Sullivan 2⅜ tool joint pipe 20 ft., two 900 gallon water tanks mounted on late model Chevrolet trucks, two 4 wheel rod trailers, two 260 gallon gasoline trailers. Equipment in top shape, used less than two years. Nothing additional needed to start drilling. Good supply extra parts. TRANS-TEX EXPLORATION CO. Box 558, Abilene, Texas. Phones 8130—2-7565.

FOR SALE: 700' 13# T&C 4⅞ casing No. 1 cheap at $1.25 FOB Lawrence. John S. Holmes, Box 435, Lawrence, Kansas. Phones 582 and 21291J.

NEW J-55 CASING AND TUBING
Trade for
Override or Working Interest
Write
P. O. BOX 1858, TULSA, OKLAHOMA

EQUIPMENT FOR SALE

AVAILABLE for sale and immediate shipment line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 585, Drumright, Oklahoma.

NEW TOWERS—1 7'-6" ID x 85'-7", 21 steel trays. One propane deasphalting plant, consisting of 3-3' ID x 50', 500# treating towers; 2-3' ID x 38' stripping towers; 1-3' x 20' scrubbing tower; 1-2' x 14' suction trap; 1-2' x 14' Interstage cooler. Kinslow Power & Equipment, Inc., 817 South Boulder, Tulsa, Oklahoma.

NEW STEEL PIPE

22" OD, 24" OD, 26" OD
¼" wall—40 foot lengths
Approximately 1000 feet of each
Ideal for conduit, culvert and water

Write—Wire—Phone

Sonken-Galamba Corp
2nd and Riverview (X-677)
Kansas City 18, Kansas
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FOR SALE

100,000' 2" O.D. x .145" Wall 2.7# Reconditioned Seamless Tubing, 14' Lengths and Over.

20,000' 2⅜" O.D. 3.75# & 4# Good Used Lapweld T&C Range 1 Line Pipe.

40,000' 2⅜" O.D. 4# Good Used Lapweld Range 1 Tubing with New 11½ V-Threads and Collars.

10,000' 3" O.D. x .300/.375" Wall 9.7# Seamless Tubing, Plain Ends, 23'-26' Lengths.

3,200' 5" O.D. x .438/.563" Wall 24.03# Seamless Tubing, 17'-25' Lengths.

2,500' 5½" O.D. 10# Reconditioned Seamless Casing, New 11½ V-Threads and New 5½" Collars (Recommended for Shallow Wells).

7,500' 6⅝" O.D. 13# Good Used Lapweld Range 1 T & C Casing.

8,000' 6⅝" O.D. 18.97# Excellent Grade Used Lapweld, Cleaned, Beveled Ends, 20' Random Mill Lengths.

5,000' 7" O.D. 17# Good Used Lapweld Range 1 T&C Casing, 11½ V-Thds.

3,200' 8⅝" O.D. 25# Good Reconditioned Casing, T&C, 8 V-Thds., Range 1.

3,100' 10¾" O.D. 32.75# Good Used Lapweld T&C Casing, Range 1, New 8-Round Threads and 8" Long Collars.

THIS MATERIAL IS AVAILABLE FOR IMMEDIATE DELIVERY, SUBJECT TO PRIOR SALE

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

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EQUIPMENT FOR SALE

FOR SALE: One 225 HP Waukesha Motor Model N K U—Skid mounted with Clutch and pulley, used less than thirty days. Suntex Drilling Company, 216 Braniff Building, Oklahoma City, Oklahoma.

FOR SALE: Cooper skid unit with Allis-Chalmers E 60 engine. Mounted on 6X6 G.M.C. truck. With or without 8 in. X 10 in. X 65 ft. single pole mast. R. G. Scott, Seminole, Okla. Phone 877.

WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

1—4'-0" ID x 40'-6" x 1¼" thick Tower. No trays. Tri-State Supply Company, Box 610, Mt. Pleasant, Texas.

FOR SALE: 24-L Bucyrus Erie Spudder, trailer mounted, excellent condition, complete with tools and wire line ready to drill. Box 1755, Parkersburg, W. Va.

COMPLETE Rotary Rig, mounted on Dodge Truck, Strong Derrick, Rig strong, sturdy, ballbearing throughout. 5½X10 Mounted Mudpump, Mission equipped. International Engine. Mounted 10 Barrel water Tank. 700 feet 2⅞, 12 pound drill pipe. 1500 foot water or oil rig. Money Maker. 2 men operate. Close Estate $5500. Cash. Box 106, Seminole, Oklahoma.

FOR SALE: BUCYRUS-ERIE MODEL 36-L SPUDDER, equipped with Waukesha GK-140 gas-gasoline engine with Butane attachments, skid mounting. Casing Tackle Strut, Tool Crane, good ⅞" drilling and casing lines, fair ½" Sand Line, and complete hand tools. Steel dog house, 1500 gallon Butane tank and Junk Rack—Price: $17,500.00. Everything in excellent condition, rig having been used for tailing-in 5" holes. Can equip with dual-tired rear axle and trailer bracket for $750.00. Also have tailing-in and top-to-bottom tools for sale. Randall-Zogg Supply Company, Princeton, Indiana. Phones: 802 and 219.

14" x 7¼" x 14" Gardner-Denver "Super Booster" Steam Pump—1500# Pattern—Good Condition. Halloran Equipment Co., 5702 Harvey Wilson Drive, Houston 20, Texas. Phone Wayside 5158.

FAILING Model "1500" Core Drill, equipped for both conventional and reverse circulation, w/ 4½" x 6" pump, heavy-duty drillhead, Kohler 1500 W Light Plant, mounted on 1946 International K-7 truck with new motor; 1948 Ford F-6 water truck w/ 500 gal. vacuum lift and Tulsa winch; 1949 1-Ton Jeep pickup w/ 4-wheel drive and new "F-Head" motor; 500' 2⅜" O.D. internal flush tubing, .28 thickness w/ 2⅞" tool joints. Can be seen in operation till Feb. 15th at 702 Wilson Street, Emporia, Kansas. Call 2539-M. New tires throughout. Top condition.

FOR SALE: Three 8000 gallon welded steel gasoline storage tanks with three angle iron supports under each tank. Tanks and supports were made to order but have not been used. About ten by fifteen feet. J. M. McDonald, Stamford, Texas.

EQUIPMENT WANTED

WANTED TO PURCHASE: Used Storage Tanks from 1,000 to 80,000 bbl. capacity, either standing or knocked down. P. O. Box 2297, or phone 4-7492, Tulsa, Oklahoma.

WANTED: 1—20½" Good used Rotary Table. 1—10¾" Good used Drilling Gate Valve. Also other items of good used Rotary Equipment. Gehring Equipment Company, P. O. Box 2290, Casper, Wyoming.

EQUIPMENT WANTED

WILL pay top price for 10,000' New or A-1 Used J-55 7" O.D. 20 and 23# Seamless Oil Well Casing 8 RT R2. 5,000' New or A-1 Used J-55 5" O.D. 13 or 15# Seamless Oil Well Casing 8 RT R2. Michigan Carlon Pipe Co., 20120 Livernois Ave., Detroit 21, Mich.

WANTED TO BUY: Seven inch hydraulic Casing Pulling Jacks with spiders. FOR SALE: Cardwell single drum, well service unit. Spools 10,000—¾" wire line. Box 4387, Oklahoma City, Okla.

HELP WANTED

WANTED
FIRST-CLASS INSTRUMENT MAN
Background in oil refinery or chemical plant instruments. Ability to instruct and train personnel in department. Good opportunity in rapidly expanding organization. Denver, Colorado, location. State full particulars in first letter. Reply Box D-856, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST, qualified for division Geologist Rocky Mountain area, with minimum eight years' experience. Wide experience desirable; four years' experience in Rocky Mountains required. Location Denver. Write, giving full details. Replies confidential. Box D-830, The Oil and Gas Journal, Tulsa, Oklahoma.

THE NEWLY organized Venezuelan Atlantic Transmission Corporation requires a Superintendent of Transmission to be responsible for physical operation of line, compressor plants along the line, transmission of gas and the forecasting and dispatching of the operation of a natural gas line. Must have minimum of 5 years experience with large natural gas company. Graduate engineer preferred. Starting salary in the range of $13,000 per year plus liberal monthly living allowances. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

Positions open for
ENGINEERS
Process (Chemical) Engineers
Construction Engineers
Project (Mechanical) Engineers

To Work On
Petroleum, Petro-Chemical and Chemical Projects

Write in complete detail, giving age, positions held, references, education, salary expected. Personal interview can be arranged.

Address Personnel Department

E. B. BADGER & SONS COMPANY

75 Pitts St., Boston, Mass.

HELP WANTED

PRACTICAL, experienced operations superintendent for independent oil company. Must be thoroughly qualified to direct the details of oil production, work-overs and well completions at all depths. Location will be in Texas but operations cover several states, mostly Texas, Louisiana, Arkansas and Mississippi. Write giving details of qualifications and experience to Box D-858, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST qualified for geological work in connection with reservoir engineering. Five years experience necessary. Experience in Permian Basin desirable. Box D-857, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT SPUDDER: Rotary & Driller. Also will farm out shallow oil properties; wells drilled, less than $500 each. Give Telephone. Box D-841, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: By reliable company more than 30 years in the business. Experienced oilfield machinery and engine salesman in Mid-Continent area. Write qualifications and experience. Box D-833, The Oil and Gas Journal, Tulsa, Oklahoma.

ELECTRICAL ENGINEER: New large oil pipeline company requires electrical engineer to handle design, construction and devise maintenance procedures, all classes equipment to 5-KV switch gear. Some familiarity with sub-stations to 110-KV, 5000-KVA desirable but not required. No communications or electronics involved. Include full professional and personal details and minimum salary, first letter. Job is permanent. Box D-761, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

WELL-KNOWN GEOPHYSICAL COMPANY HAS OPENING FOR AN EXPERIENCED SEISMIC PARTY CHIEF AND A COMPUTER. EXCELLENT OPPORTUNITY WITH COMPENSATION BASED ON COMPETENCE OF APPLICANTS.

Box D-831

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

ASPHALT REFINERY
SUPERVISOR AND TECHNOLOGIST

We have an immediate opening for a man whose educational background and experience qualifies him to supervise a refinery asphalt department. He will be responsible for the development and manufacture of a wide variety of asphaltic products. We feel this is an excellent opportunity for the right man and starting salary is commensurate with ability and experience. Location: East Central U. S. Address request for application to Box D-854, The Oil and Gas Journal, Tulsa, Oklahoma, and include a brief summary of vital statistics, education and experience. All applications will be held in strict confidence.

WANTED—FOR SALVAGE!

We will pay spot cash for:

DISCONTINUED PIPE LINES
and
ABANDONED OIL WELLS

Write us complete details or phone us collect.

VALLEY STEEL PRODUCTS CO.

124 Sidney St. — **St. Louis 4, Mo.**
LAclede 2100 — **P. L. LaBarge**

WANTED: RESEARCH AND DEVELOPMENT ENGINEERS AND PHYSICISTS WITH EDUCATIONAL BACKGROUND IN MECHANICAL, ELECTRICAL OR ELECTRONIC ENGINEERING, PHYSICS OR ENGINEERING PHYSICS FOR OPENINGS IN PLANT AND LABORATORY INSTRUMENTATION, PHYSICAL MEASUREMENTS, GEOPHYSICS, AND INDUSTRIAL ELECTRONICS. PREFER PERSONS WITH TWO TO FOUR YEARS EXPERIENCE IN EXPERIMENTAL RESEARCH DESIGN AND DEVELOPMENT OF INSTRUMENTS, INTRICATE MECHANISMS, ELECTRONIC APPARATUS, OPTICAL EQUIPMENT, SERVO-MECHANISMS OR ALLIED FIELDS. POSITIONS ARE OF IMMEDIATE AND PERMANENT IMPORTANCE TO OUR OPERATIONS. WRITE PERSONNEL DIRECTOR, RESEARCH AND DEVELOPMENT DEPARTMENT, PHILLIPS PETROLEUM COMPANY, BARTLESVILLE, OKLAHOMA.

HELP WANTED

ENGINEERS, EXECUTIVES, TECHNICAL MEN, SALARIED POSITIONS—$3600 TO $30,000. THIS CONFIDENTIAL SERVICE FOR OUTSTANDING MEN WHO DESIRE A CHANGE OF CONNECTION, WILL DEVELOP AND CONDUCT PRELIMINARY NEGOTIATIONS WITHOUT RISK TO PRESENT POSITION. SEND NAME AND ADDRESS FOR DETAILS. TOMSETT ASSOCIATES, 1204 BERGER BLDG., PITTSBURGH 19, PA.

THE NEWLY organized Venezuelan Atlantic Transmission Corporation requires an experienced Combustion Engineer to promote the sale of natural gas to Venezuelan industries. Must be able to demonstrate advantages of natural gas consumption and advise customers on plant conversion. Prefer candidate with working knowledge of Spanish. Starting salary range approximately $8,500 per year plus liberal living allowances. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

WANTED IMMEDIATELY ENGINEER experienced in natural gas utility field by one of fastest growing natural gas companies in Southwest. Must have following qualifications: More than 30 years of age. Prefer person with college degree in engineering: petroleum, civil or mechanical. At least three years of college and five years of experience with natural gas or natural gasoline company, including the following phases—drafting, compressor station design and operation, hydrogen sulfide removal plants, gas well testing, gas measurement, drilling operations. Salary commensurate with experience. Pleasant working conditions, numerous attractive employee benefits after period of regular employment. Location in Dallas, Texas. Submit abstract of experience, qualifications, employment history to Box D-865, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—INSTRUMENT MEN

Experienced in oil refinery or chemical plant instruments. Denver, Colorado, location. State age, experience and salary expected in first letter. Box D-855, The Oil and Gas Journal, Tulsa, Oklahoma.

SHIFT SUPERVISOR: Responsible for supervision of Catalytic Cracking and Poly Plant operations, plus general supervision over process workers during shift. Must be experienced and thoroughly familiar with all phases of refinery operation. Location—Artesia, New Mexico. Write New Mexico Asphalt & Refining Company, Artesia, New Mexico, giving full particulars of qualifications, experience and references.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00 Oil Industry Mailing List, Box 2603, Tulsa Okla.

SITUATIONS WANTED

GRADUATE GEOLOGIST
desires position with Los Angeles headquarters. Atlantic 4-2420, Los Angeles.

LANDMAN, twelve years experience with background of scouting, production accounting and purchasing desires permanent connection. References furnished. Available February 15th, 1951. Write Box D-849, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER, 1 year experience petroleum engineering Lab. 2 Years drilling operations. Desires Domestic or Overseas position. Box D-803, The Oil and Gas Journal, Tulsa, Okla.

GEOLOGIST *and* LANDMAN

Former Division Manager of Exploration and Land Department for major company and former District Geologist for major company desire connection with financially able party or independent company on a retainer plus interest basis for drilling projects, leases and royalty in Texas, New Mexico, and Rocky Mountains.

BOX D-867

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

SITUATIONS WANTED

FIFTEEN YEARS Gas, casinghead gas, industry. 36 year old junior executive presently employed, desires change. Box D-862, The Oil and Gas Journal, Tulsa, Oklahoma.

TITLE ATTORNEY—Draft exempt, thoroughly experienced in oil industry, desires connection with a future. Box D-863, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST - GEOLOGIST: Graduate, married, 11 years' experience. Desires position with independent, permanent location only. Reply Box D-868, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY FOREMAN, self-retired recently from major oil company, seeking reemployment. Over twenty years refinery experience, covering all phases. Prefer domestic but will consider foreign service. Fluent Spanish. Excellent references. Box D-872, The Oil and Gas Journal, Tulsa, Oklahoma.

FIELD and Plant Instrumentation Supervisor: Twenty years on the job experience. Instrumentation of gas gathering systems, refinery, gasoline, and chemical plants. Practical experience in instrument specification, purchasing, installation and maintenance. Employed now supervisory level. Box D-870, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM engineer in Venezuela desires foreign or domestic employment. Three years experience. Excellent knowledge of Spanish. Box D-871, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED PETROLEUM GEOLOGIST Single, Draft-exempt, Nine years major company experience, four years independent geological experience. Specialist in all phases subsurface and well work. Opportunity for advancement important. Location—open. Box D-874, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 46, 24 years experience in drilling and production operations, well completions and workover operations. Desire connection with progressive independent. Immediately available. Box D-873, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN and TITLE CURATOR, age 28, five years' experience contract land work. Desire position with Major or Large Independent. Capable of all phases Land Department. Box D-844, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Married, 30, graduate Texas A. & M., eight years diversified production, drilling, and surveying experience. Will consider any engineering position offering opportunity for advancement. Box D-839, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No. 131. Ph. No. 131, Hobbs, New Mexico.

PRODUCTION FOR SALE

40 ACRES with three sand wells, 1200 bbls. monthly production, near Tulsa. Owners wish to retire. P. O. Box 26, Tulsa.

FOR SALE: 57 Oil and Gas wells, settled production, well equipped. Half may be pulled without affecting production very much. For particulars write Box 1755, Parkersburg, W. Va.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request Lancaster, Allwine & Rommell Registered Patent Attorneys, Suite 418 815-15th Street, N.W., Washington 5, D. C

ROYALTIES

ROYALTY
Am selling a small part of the Gross Earnings, to be known as Royalty, earned by a stated size Drilling Machine. Write O. K. Machine Shop, 1026-16th St., Rock Island, Ill.

SPOT CASH PAID FOR PRODUCING ROYALTY. SMALL TO LARGEST BLOCKS IN SETTLED OR OLD PRODUCTION ONLY. Oil Specialists since 1934. GERBER & CO., 120 WALL STREET, NEW YORK.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225 Great Falls, Montana.

LEASE AND DRILLING BLOCKS

FOR SALE: One Half interest in proven lease in Ector County, Texas, to 5700 feet for $75,000, with return of cost of well out of three-fourths of production. Box 2626, Odessa, Texas.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

INVESTMENTS: Excellent opportunities in secondary recovery in Bradford, Penna., district. Principals only. Box D-866, The Oil and Gas Journal, Tulsa, Oklahoma.

WISH to contact driller with own rig or parties financially able to have hole drilled and properly completed within 90 days on interest basis. Will exchange interest in well for casing and tubing. Royalty for new automobile and a light metal airplane. Two pay zones under 2400 feet. Land located in North Central Texas. Box 1512, Dallas.

THREE virgin structures in a block ½ mile from gas line; three miles from Cookeville; ideal location. N. M. Sauls, Cookeville, Tenn.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
8635 Delmar Ave., St. Louis 5, Mo.

Have Leased 20,000 Acres

Southwestern British Columbia. On seaport. Geology good. Want parties interested to drill.

For further information write:
Box 651, Blaine, Washington

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

BUSINESS OPPORTUNITIES

FOR SALE as a going concern Hightower Oil & Refining Corporation, Brownwood, Texas. Lease equipment, drilling equipment, sundry production equipment, gas distribution equipment, office building, office equipment, automobiles, trucks, leasehold interests, royalty interests, office site, City of Brownwood, right-of-way, shop equipped. For details as to assets inquiry should be addressed to Hightower Oil & Refining Corporation, Brownwood, Texas. TERMS: Cash.

FOR SALE: 17,000 acre ranch in West Texas with all of the minerals for $7.50 per acre. Write C. L. Milburn, Odessa, Texas.

WANTED

WANTED TO PURCHASE OR LEASE

Petroleum Refinery currently not being used or portion of operating refinery available for sublet for processing and finishing partly refined stocks. Require site located Group 3 with variety unused tankage, railroad siding, barreling facilities or building, high pressure steam, ground space for installation additional refining equipment.

Write full details to

Box D-853,

The Oil and Gas Journal,

Tulsa, Oklahoma

EQUIPMENT MEN

(Continued from page 126)

Welex Officer Speaks to Water-Flood Operators

G. A. JAGGERS

George A. Jaggers, vice president of Welex Jet Services, Inc., was the principal speaker at the January 17 dinner meeting of the Kansas Oklahoma Water-Flood Operators held at the Booth Hotel in Independence, Kans.

Subject of the meeting program was casing perforating and open-hole shooting by means of shaped charges with particular emphasis on the shooting of water-input wells.

Jaggers used lantern slides to illustrate many of the technical points of his discussion.

In charge of program arrangements for the Water-Flood Operators meeting was D. B. Taliaferro, principal petroleum engineer with the Bureau of Mines at the Petroleum Experiment Station, Bartlesville, Okla.

General Controls Opens Indianapolis Branch

General Controls Co., manufacturer of automatic pressure, temperature, level, and flow controls, has opened a factory branch sales office in Indianapolis, it has been announced by J. F. Ray, vice president in charge of sales.

Richard H. Weber has been named to manage the new office, which will be the twenty-fourth factory branch office to be established by General Controls in strategic trading areas throughout the nation. The Indianapolis branch will cover territory formerly serviced by the company's Chicago and St. Louis offices and will be under the supervision of the Chicago branch.

Weber is a mechanical-engineering graduate of University of Cincinnati. From 1944 on he served in a selling capacity for several industrial corporations. Weber was employed by James H. Rhodes & Co. of Chicago and, until his present association with General Controls, with Engineering & Equipment Co. of Cincinnati.

Warden & Sons Made Johnson West Coast Distributors

Johnson Corp., of Three Rivers, Mich., manufacturers of steam specialties, has announced a change in representation of the West Coast.

Guy L. Warden & Sons, formerly district representatives for Johnson in lower California, will now cover the entire state, as well as the counties of Curry, Josephine, and Jackson in Oregon. In addition to the office in Los Angeles, Warden & Sons has now opened offices in Oakland.

Key Co. Authorizes English Firm to Make Return Bends

Key Co., of East St. Louis, Ill., has recently entered into a licensing agreement with Lake & Elliott, Ltd., Braintree, England, for the manufacture of return-bend fittings designed and engineered by Key Co.

Similar licensing agreements have been in effect for the past several years between Key Co. and Societe Francaise des Constructions, Paris, France, and Compagnia Tecnica Industrie Petroli, Rome, Italy.

G. C. Smith of Key Co. and R. J. Hart, chief inspector of Lake & Elliott, Ltd., examining a prototype header and radiograph in the laboratory of the Lake & Elliott foundry at Braintree, England.

Wilson Leaves Independent Offers Consulting Service

J. H. WILSON

John H. Wilson, vice president and manager of Independent Exploration Co.'s North Texas office in Fort Worth, has resigned to open his own office as a consultant specializing in exploration programs. He will serve Independent Exploration Co. as a consultant.

David B. Campbell, with Independent for 15 years and former supervisor of the Fort Worth office, has been moved up to the position of district manager. He will be assisted by George H. Harrington, Jr., who has also served in Independent's Fort Worth office for several years.

New Bearing Firm Opens Tulsa Office, Warehouse

The opening of Clark Bearing Specialist & Supply Co. in Tulsa has recently been announced. Offices and warehouse will be located at 420 E. Thirteenth Street.

The new firm has become the authorized distributor for Bower Roller Bearing Co., Hyatt Roller Bearings, New Departure Ball Bearings, M-R-C Bearings Service Co., Norma-Hoffmann Bearing Corp., Roller Bearing Co. of America, SKF Industries, Inc., and National Oil & Grease Seals.

National Supply Merges Engine Sales and Service

National Supply Co.'s engine division has completed a consolidation of its sales and service facilities with those of Atlas Imperial Diesel Engine Co., according to F. R. Kilberry, engine division general manager. The purchase of the assets of Atlas Engine Co. by National Supply was consummated on July 24, 1950.

As announced by Kilberry, this consolidation now enables the company to offer extensive sales and service facilities on National's Atlas and Superior diesel, gas, dual-fuel, and Chrysler marine gasoline engines.

LEGAL

Sealed Bids will be received at the Jicarilla Indian Agency, Dulce, New Mexico, until 3:00 o'clock P.M., MST, February 20, 1951, and then publicly opened for oil and gas leases on 47 Tracts of Jicarilla Tribal Indian lands within the Jicarilla Indian Reservation, totaling approximately 117,760 acres. Each tract contains approximately 2560 acres, and are located in the Rio Arriba and Sandoval Counties of New Mexico. For complete description of the land and location, provisions and stipulations of the leases to be sold, address the Superintendent, Jicarilla Indian Agency, Dulce, New Mexico. Guy Hobgood, Superintendent.

Oklahoma Fields

(Continued from page 111)

shooter 4,550 ft., Checkerboard 4,800 ft., Big lime 4,906 ft., Oswego 4,972 ft., Prue 5,210 ft., Bartlesville 5,220 ft.

Garvin County: Creslenn Oil 1 Price, SW SE NE 9-3n-1e, dry, TD 3,647 ft., basal Pennsylvanian-McLish 3,514 ft., McLish sand 3,587 ft.

Jackson County: Co-op Refining Assn., 1 Long, C NE NE 9-1s-23w, dry, TD 5,310 ft., Wichita-Albany 1,750 ft., Panhandle dolomite 2,460 ft., lime 2,945 ft., Cisco 3,034 ft., Cisco lime 4,332 ft., top Canyon 4,967 ft., porous lime 4,980 ft.

LeFlore County: LeFlore County G. & E. P-5 Redwine, SW NE SW 7-8n-25e, dry, TD 2,130 ft., broken sand 1,754 ft. and 2,118 ft.

Lincoln County: W. A. Delaney, Jr. 1 Ivens "A," NW NE NE 22-13n-5e, dry, TD 4,120 ft., Hogshooter 2,260 ft., Checkerboard 2,647 ft., Oswego 3,477 ft., Prue 3,507 ft., Skinner 3,697 ft., Red Fork 3,882 ft., Inola 4,021 ft., Bartlesville 4,045 ft.

Herndon Drilling 1 Griffith, SW SW SE 17-16n-2e, dry, TD 5,285 ft., upper Pawhuska 1,708 ft., lower Pawhuska 1,870 ft., Belle City 2,933 ft., Hogshooter 3,538 ft., Layton 3,574 ft., Checkerboard 3,805 ft., no conglomerate, Oswego 4,300 ft., Preu 4,428 ft., Verdigris 4,470 ft., lower Skinner 4,597 ft., lime 4,600 ft., no Red Fork or Bartlesville, basal Pennsylvanian-Mississippian 4,740 ft., Woodford 4,792 ft., Hunton 4,832 ft., Sylvan 4,932 ft., Viola 5,037 ft., Wilcox 5,158 ft., second Wilcox 5,257 ft.

Logan County: Smith & Cleary 1 Kihega, NW SW SW 7-17n-1e, dry, TD 4,704 ft., Tonkawa sand 2,103 ft., Oread 3,202 ft., Avant 3,882 ft., Oswego 4,398 ft., Red Fork 4,653 ft.

Osage County: Muddy 1 Osage, SW SW SE 20-27n-10e, dry, TD 2,126 ft., sand 895 ft. and 1,025 ft. both with show of gas, Big lime 1,290 ft., Oswego 1,380 ft., Squirrel 1,610 ft. with show of oil, Mississippi lime 1,819 ft., basal Mississippian 2,073 ft., sand 2,096 ft., shale 2,098 ft., Viola 2,113 ft., Wilcox 2,118 ft.

Pottawatomie County: Ashland et al 1 Bailey, SW SE SW 2-7n-2e, dry, TD 5,671 ft., Pawhuska 2,222 ft., Tonkawa sand 2,745 ft., Belle City 3,267 ft., Hogshooter 3,610 ft., Checkerboard 3,900 ft., Oswego 4,036 ft., Prue 4,169 ft., Earlsboro 4,453 ft., lime 4,735 ft., basal Pennsylvanian 4,995 ft., Haragan 5,024 ft., Chimney Hill 5,175 ft.

Seminole County: Garr-Wooley Co. 1 Reed, SE SE NW 3-7n-5e, dry, TD 4,526 ft., lime 3,410 ft., shale and lime 3,503 ft., shale and sand 3,535 ft., shale, lime, and sand 3,840 ft., shale and lime 3,965 ft., lime and shale 4,015 ft., lime 4,285 ft., lime and sand 4,435 ft., sand 4,449 ft., shale, lime, and sand 4,464 ft., lime 4,492 ft., lime and sand 4,508 ft., sand and lime 4,521 ft.

Davey and Powell 1 Replogle et al, NW NW NE 9-9n-8e, dry, TD 2,227 ft., Calvin 1,920 ft., Senora sand 2,208 (?) ft.

Stephens County: Love 1 Green, NW NW NW 3-2s-9w, dry, TD 2,034 ft., sand 1,783 ft., 1,855 ft., 1,881 ft., and 1,918 ft., lime 1,962 ft.

Sinclair Oil & Gas and Little 1 Green est., SE SW NE 25-1n-5w, dry, TD 9,007 ft., Hoxbar 3,281 ft., Deese 4,881 ft., Springer 7,329 ft., Aldridge sand 7,422 ft., Humphrey sand 7,942 ft., Simpson sand 8,321 ft., broken sand 8,685 ft.

Woods County: Amerada, Superior, and Atlantic 1 Federal unit, C NE SE 3-22n-13w, dry, TD 8,444 ft., anhydrite 2,540 ft., Hoover 4,210 ft., Oread 4,525 ft., Tonkawa 4,867 ft., upper Layton 5,237 ft., lower Layton 5,730 ft., Hogshooter 5,870 ft., Checkerboard 6,023 ft., Big lime 6,163 ft., Oswego 6,220 ft., lime 6,538 ft., Chester 6,590 ft., Manning 6,665 ft., St. Genevieve 7,012 ft., St. Louis 7,058 ft., Osage 7,200 ft., Kinderhook 7,600 ft., Chattanooga 7,670 ft., Bois d'Arc 7,750 ft., Chimney Hill 7,830 ft., Sylvan 7,942 ft., Viola 8,050 ft., Trenton 8,150 ft., dolomite 8,200 ft., second Wilcox 8,325 ft.

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Permian Basin

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NW Odessa, dry, TD 5,917 ft. elev. 3,045 ft., Holt 5,230 ft.

Kent County: L. A. Douglas & Sojourner Drilling Co. 1 I. V. Hager, 79-1-H&GN, 4 mi. W Girard, dry, TD 7,438 ft., elev. 2,138 ft., reef 6,555 ft., Ellenburger 7,398 ft.

Lubbock County: C. Alvin White et al 1 Dr. H. H. Bidwell, 26-CB-C&M, 12 mi. SW Lubbock dry, TD 10,256 ft., elev. 3,343 ft., Yates 2,650 ft., San Andres 3,958 ft., Strawn 10,290 ft.

Motley County: Amerada Petroleum Corp. 1 Ollie Birnie, 1-GP-C&M, 4 mi. N Whiteflat, dry, TD 10,010 ft., elev. 2,595 ft., Clear Fork 2,517 ft., Wolfcamp 4,300 ft., Cisco 5,525 ft., Mississippian 9,205 ft., pre-Cambrian 10,001 ft.

Pecos County: Union Oil Co. of California 1 J. S. Anderson, 20-145-T&St.L., 18 mi. SW McCamey, dry, TD 1,809 ft., elev. 2,480 ft., San Andres 1,415 ft.

Runnels County: R. L. Wheelock, Jr., 1 E. Michelis, Sec. 448, Friley Sur., dry, TD 5,485 ft., elev. 2,028 ft., Palo Pinto 4,310 Capps 4,595 ft., Gardner 5,112 ft., Odom 5,242 ft., Ellenburger 5,405 ft.

American Trading & Production Corp. 1-62 Otto Spreen, R. M. Williams Sur., 6 mi. E Ballinger, dry, TD 4,198 ft., elev. 1,690 ft., Serrat sand 2,210 ft., Home Creek 2,355 ft., Capps 3,425 ft., Jennings 3,655 ft., Gardner 3,710 ft., Marble Falls 3,920 ft., Ellenburger 4,045 ft.

Schleicher County: Placid Oil Co. 1 E. M. Jackson, 67-K-GH&SA, 9 mi. SE Eldorado, dry, TD 6,553 ft., elev. 2,334 ft., Canyon 4,902 ft., Strawn 5,495 ft., Ellenburger 6,447 ft.

Scurry County: Sells Petroleum Co. 1 L. A. Marchbanks, 164-97-H&TC, 13 mi. SW Snyder, dry, TD 3,560 ft.

TEXAS PANHANDLE (DISTRICT) 10 WILDCAT FAILURES

Donley County: Lewis W. Welch 1 Lazy R-G Ranch, 150-E-D&P, 10 mi. S SE Clarendon, dry, TD 7,110 ft., elev. 2,499 ft., cored 2½ ft. pre-Cambrian 6,965-67½ ft.

Ochiltree County: Walter Duncan 1 Brunsteter, 22-R-B&B, 3 mi. E, 2½ mi. N of SW corner of county, dry, TD 9,521 ft., elev. 3,091 ft., Spergen sand 9,220 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—The Texas Co. 1-AN State, major extension to the Saunders Pennsylvanian field, or new discovery, logged additional pay from 9,801-35 ft. Earlier, a test from 9,771-9,800 ft. produced a flow of 89 bbl. of 42°-gravity oil. After drilling ahead a test to 9,835 ft. developed a flow of 33 bbl. of oil in 1 hour.

Amerada Petroleum Corp. 2 Caudle, 1-mile west extension to the Bagley field of northwestern Lea County, was ready for completion after flowing 11 bbl. of oil an hour from perforations in the Devonian at 11,012-045 ft.

Ohio Oil Co. 3 Denton, northwest offset to the Devonian discovery of the Denton field, flowed 280 bbl. of oil in 8 hours, without acid, from perforations at 11,916-976 and 11,986-12,024 ft. It was also in the completion stage.

On the northwest side of the Brunson Ellenburger field, Tide Water Associated Oil Co. 4-S State, flowed 180 bbl. of 41°-gravity oil in 8 hours through ¼-in. choke. Perforations were from 7,800-25 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Eddy County: S. P. Yates Drilling Co. 1 Galvin, 13-20s-26e, dry, TD 2,118 ft., elev. 3,323 ft., Queen 630 ft., San Andres 1,610 ft.

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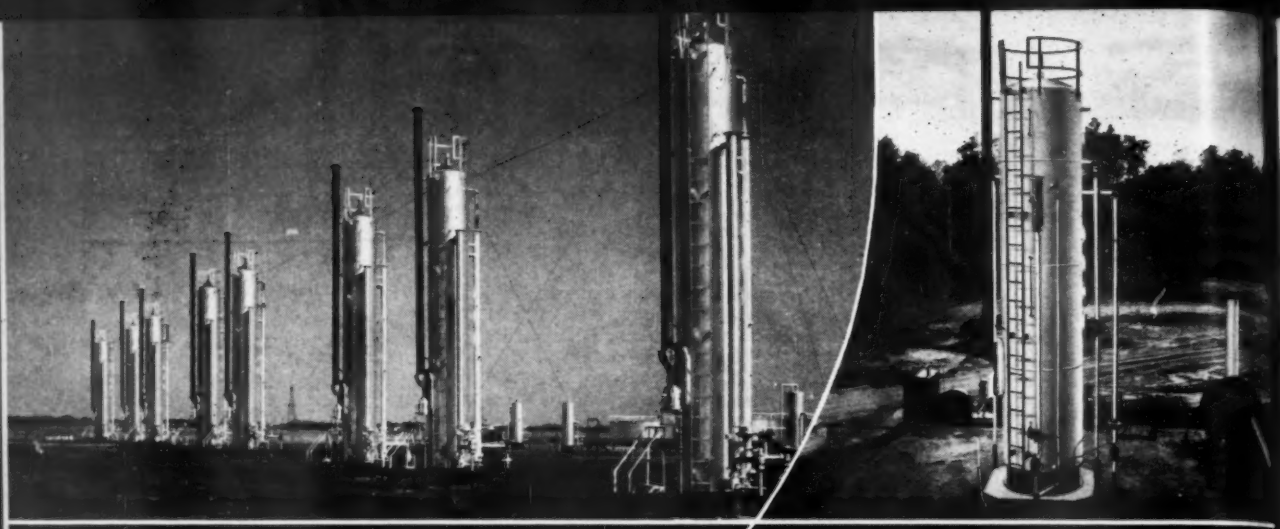
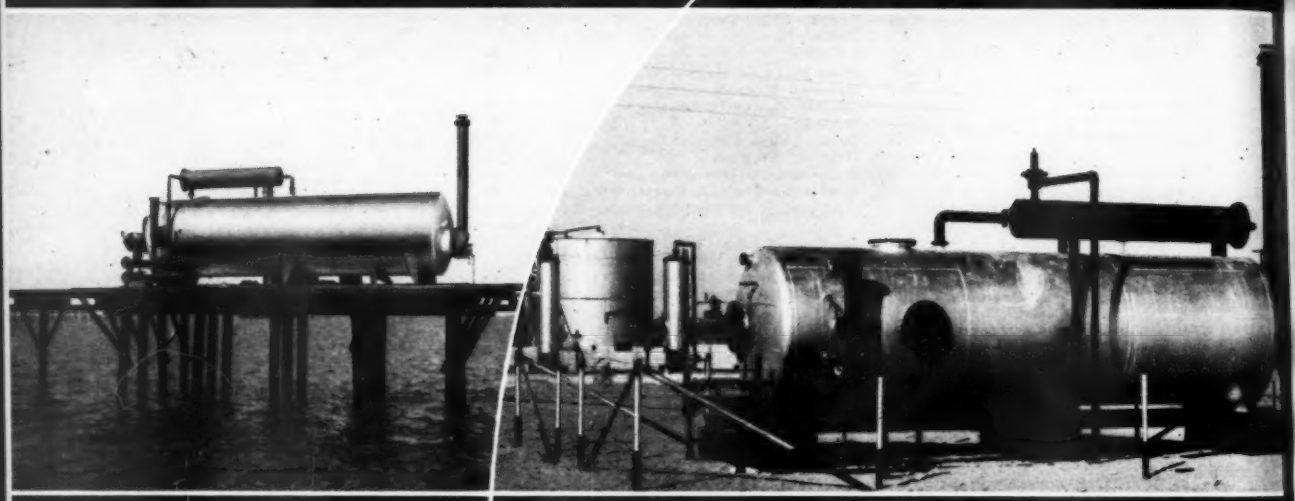


8 — 4′ x 27′ 6″ ICP Emulsion Treaters

6′ x 27′ 6″ XCP Emulsion Treater



8′ x 27′ 6″ Horizontal Treater on Offshore Location

6′ x 20′ Horizontal Treater

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THIS LABORATORY SHOT* shows the bottom pattern and clean, full-gauge perimeter possible with the Hughes Tri-Cone bit design. Better than any words, this hard, pink quartzite test block, having a compressive strength of 68,000 pounds per square inch, shows how efficiently this rock bit drills.

Naturally, we do not pretend that the bottoms of holes drilled in the field by Hughes bits are exact replicas of this, but we *do* think the picture depicts clearly the efficiency of the Hughes Tri-Cone design.

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*Unretouched photo.

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